UCLA Luskin Center for Innovation

Informing effective and equitable environmental policy

Depaving California Schools for a Greener Future

KEY BARRIERS AND POLICY RECOMMENDATIONS

BY MELODY NG AND JARED B. COFFELT

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REPORT

UCLA Luskin Center for Innovation

Informing effective and equitable environmental policy

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Cover photo: East Oakland Pride Elementary School, in Oakland Unified School District (OUSD), California / Alessandro Ossola

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ABBREVIATIONS

Abbreviation	
California	
CAL FIRE	California Department of Forestry and Fire Protection
CDE	California Department of Education
DGS	Department of General Services
DIR	Department of Industrial Relations
DSA	Division of the State Architect
DTSC	Department of Toxic Substances Control
LADWP	Los Angeles Department of Water and Power
OPSC	Office of Public School Construction
SAB	State Allocation Board
SFP	School Facilities Program
SFTSD	School Facilities and Transportation Services Division
SWRCB	State Water Resources Control Board (State Water Board)
LAUSD	Los Angeles Unified School District
BOE	Board of Education
CPM	Complex Project Manager
ESO	Eco-Sustainability Office
FSD	Facilities Services Division
M&O	Maintenance & Operations
OEHS	Office of Environmental Health and Safety

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EXECUTIVE SUMMARY

As California's residents have experienced extreme heat related to climate change, government agencies and nongovernmental organizations have invested in solutions to mitigate this impact. Public schools have become key institutions for climate resilience investments, including tree planting in schoolyards. However, despite the increasingly supportive policy and cultural environment for schoolyard greening at the state and local levels, one of the key barriers to installing green infrastructure is that asphalt or other impervious surfaces cover the outdoor spaces of a majority of California's K–12 public schools. This report assesses the policies and sociocultural factors that have contributed to, and continue to keep in place, the extensive amount of hardscaped ground surfaces in California schools. The report concludes with potential actions and research directions to further encourage depaving of California school landscapes.

While the report explores policies and other historical developments in California more broadly, it focuses primarily on the Los Angeles Unified School District (LAUSD). LAUSD is the second-largest school district in the United States and one of the largest landowners in California.[1] As the largest of California's 937 school districts,[2] it also houses a disproportionate number of the state's public schools — over 770[3] of almost 10,000 public schools.[4]The district has been recognized by the White House for its efforts to increase the sustainability of its schools and to protect its students from the worst effects of climate crises.[5] Consequently, LAUSD is a prime case study to examine the barriers to schoolyard greening and potential solutions. The strategies that emerge from LAUSD may serve as models for schoolyard greening in the state. Further research is needed on the variation in policies and practice pertaining to school greening and depaving in the geographically and socioeconomically diverse communities across California.

Summary of Findings

The extent of hardscape in California's K–12 public schools was not produced or maintained by any single policy. A dynamic set of broad systemic and local context-specific factors produced a network of preferences, practices, and policies that impacted local school district decision-making and contributed to the level of asphalt and likely other impervious surfaces seen in California's schoolyards today. (The terms "hardscape" and "impervious surfaces" acknowledge that there are a variety of hard surfaces in schools. However, for the purposes of this report, which focuses specifically on the factors that influenced the prevalence of asphalt in schools, these terms refer primarily to asphalt.)

Historical factors that contributed to large quantities of impervious surface in California's schools include:

- Open-space school campus designs that were encouraged from the 1940s onward as a means to readily accommodate future student population growth, given that state school building seismic safety standards have pushed schools to expand outward rather than vertically

- Physical education (PE) standards and curricula that focused on preparing students for military service and were heavily influenced by organized sports and other activities that require impervious surfaces
- Education administration researchers and school design advocacy organizations who promoted asphalt to school administrators in the mid-20th century as a durable material that would provide students year-round all-weather access to playgrounds while a majority of California's current school building stock was constructed during the midcentury
- A state school funding structure that relied primarily on local property taxes (i.e., local school construction bonds) to fund school facility repairs and improvements and that likely contributed to schools prioritizing low-maintenance campus designs and limiting landscape and infrastructural features that require more maintenance.

Factors that keep asphalt and other impervious surfaces in place include:

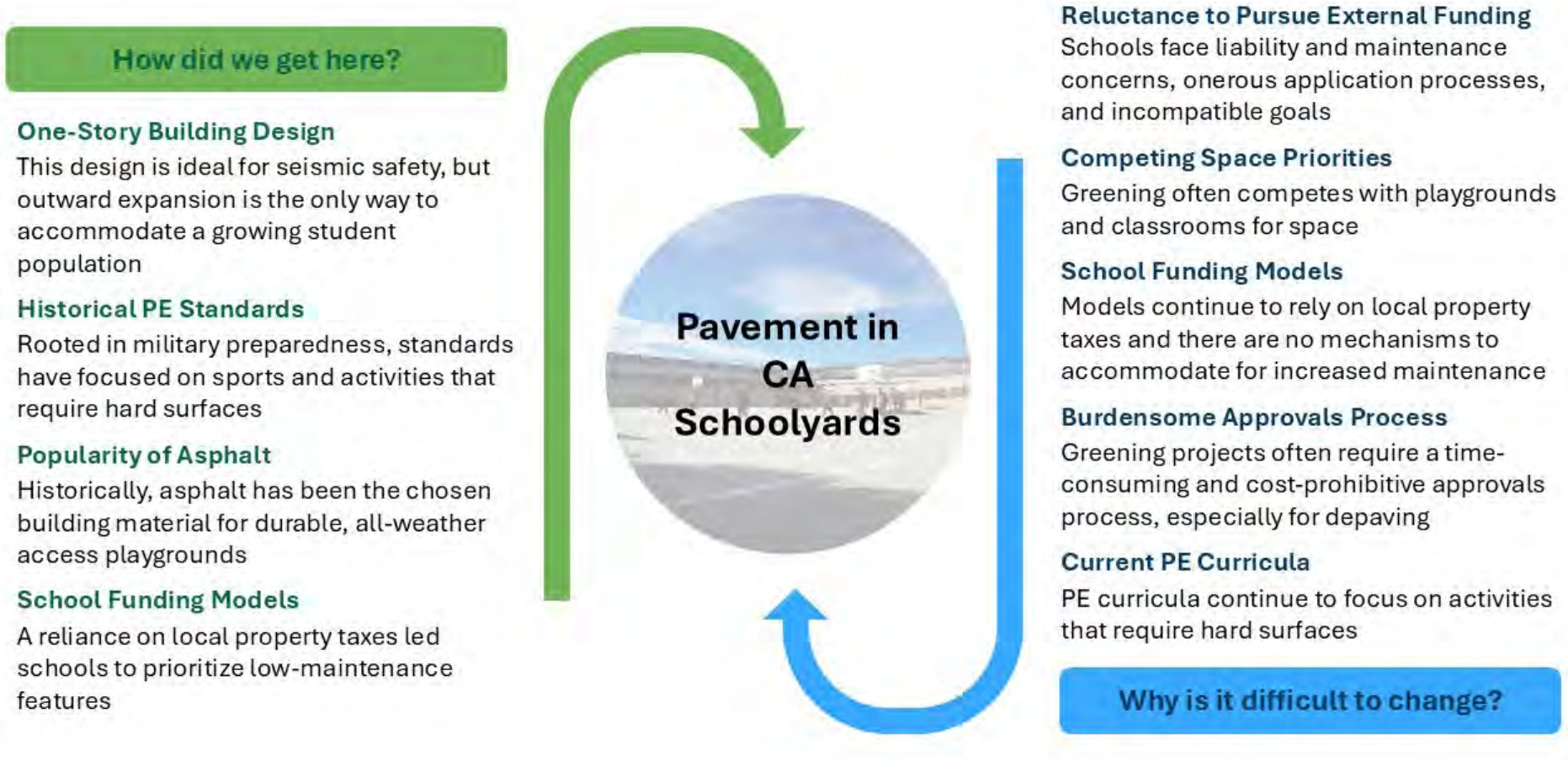
- Current PE curricula that focus narrowly on mastery of physical skills through activities best facilitated by hard-surfaced courts and fields
- Local and state approvals processes influenced by state school building safety regulations, which include Americans with Disabilities Act (ADA) compliance, for larger-scale greening projects involving depaving that can make securing approvals time-consuming and cost-prohibitive (e.g., Title 24 regulations enforced by the Division of the State Architect [DSA])
- A state school funding structure that (1) continues to rely primarily on local property taxes (i.e., local school construction bonds) to fund school facilities repairs and improvements and (2) due to 1970s-era state anti-tax policies, does not provide enough school operational funding to compensate for the increased grounds maintenance staffing (M&O) required to maintain greener school campuses
- Efforts to depave and green schools potentially competing for finite space on school campuses that might already be (over)committed to accommodating two perpetually competing top school district priorities: providing enough classrooms to house current and future students and meeting minimum playground space requirements (i.e., Title 5 regulations for school facility design)
- School districts not pursuing or having difficulty securing funding opportunities that can be used to support depaving and greening efforts because of burdensome and sometimes unclear application processes, internal district objectives that may be misaligned with grant funding program objectives, and reluctance to take on projects that involve major campus infrastructure alterations due to anticipated liability and maintenance costs.

Preliminary recommendations to alter the incentives that keep impervious surfaces in place and to ensure the necessary resources to support depaving in schools include the following:

- Since PE standards are locally controlled, devising PE standards to accommodate more free and unorganized play activities that might encourage schools to adopt playground designs that include more depaved areas to accommodate such activities
- Since the California Department of Education's *Guide to School Site Analysis and Development* describes design standards for school land use planning, encourage the CDE to issue guidance for school districts to accommodate green space development goals in school site planning
- Since the School Facilities Program (SFP) provides a major source of state-level funding for school facilities construction in the present, encourage the state to (1) modify/include provisions of the SFP's subprograms (New Construction, Modernization, and Joint Use) to permit and encourage the use of SFP funds for depaving and greening efforts in existing schools and to introduce depaved greenspaces in new schools and (2) increase the amount of state-level funding allocated to the SFP to ensure there is enough funding to support their increased use for depaving and greening efforts in the future
- Encourage the state and localities to integrate school districts, which have been so far excluded, in stormwater programs that have been implemented to encourage property owners to depave
- Encourage the administrators for water management and other types of climate and sustainability funding programs to develop clear guidelines for project proposals that accommodate the specific needs of schools in project design and implementation
- Educate policy makers about the value of schools as anchor institutions (i.e., hubs of concentrated community use and activity) that are ideal demonstration sites for green infrastructure projects.

FIGURE ES-1

Graphical Abstract of Factors Contributing to the Prevalence of Impervious Surfaces in California Schoolyards



A number of historical influences (green) led to the proliferation of pavement throughout California schools, while various other factors make removal of such surfaces difficult (blue)

1. INTRODUCTION

1.1. Schoolyard Greening Efforts in California

As California's residents have experienced historic, record-breaking weather-related impacts of the climate crisis — like extreme heat[6] — over the past decade, government agencies and nongovernmental organizations have been collectively investing in and implementing solutions to address these impacts. Given the large number of children who attend K–12 public schools in California — approximately 5.8 million students[7] — and the significant amount of time they spend daily on campus, schools have become key institutions to invest in heat and climate resilience efforts. In the Los Angeles Unified School District (LAUSD), the second-largest school district in the country with approximately 550,000 students,[8] 85% of students attend schools with little or no tree canopies for shade, hardscaped playgrounds, and minimal outdoor learning opportunities.[9] Consequently, cooling and sun-safety efforts include installing vegetation as critical green infrastructure, like shade trees, on playgrounds and other areas of school campuses.

Schoolyard greening work has been driven by and supported at the civic level by nongovernmental organizations, like Green Schoolyards America (GSA), which advocates for policies that support depaving school playgrounds and transitioning them into more park-like green spaces. GSA has collaborated with the California Department of Education (CDE), the California Department of Forestry and Fire Protection (CAL FIRE), and Ten Strands — an organization that aims to increase environmental literacy in public schools — on the California Schoolyard Forest System, a statewide initiative to increase tree canopy in California pre-K–12 schools to protect students from extreme heat due to climate change.[10] GSA has also launched a Regional Leadership Institute for schoolyard greening in Southern California.[11] In greater Los Angeles, other nonprofit and nongovernmental organization-led schoolyard tree planting and greening efforts include, but are not limited to:

- Trust for Public Land's partnership with school districts and local nonprofits in Los Angeles through their Los Angeles Green Schoolyards Initiative to transform 28 asphalt playgrounds into high-quality green spaces for students and locals[12] — an effort belonging to its broader Community Schoolyards initiative, which has transformed nearly 300 schoolyards around the country;[13]
- TreePeople's efforts to help catalyze greening schools as a priority and establish one of the "largest school greening movements that centers academic achievement, health, and equity for students across California" through partnerships with school districts across Southern California, including LAUSD,[14] and schoolyard greening projects at over 40 schools in the Greater Los Angeles area;[15]
- North East Trees' work to increase tree canopy and green spaces in underinvested communities in Los Angeles, which includes depaving schoolyards to support the expansion of urban habitat in several dozen schools;[16]

- Amigos de los Rios' work leading green schoolyard transformations at over 16 schools across Southern California;[17]
- Los Angeles Beautification Team's work designing tree planting and other green and resource conservation projects to improve school campuses, neighborhoods, and business districts, including work across 140 public schools in the last 20 years;[18]
- Koreatown Youth and Community Center's collaboration with LAUSD to remove 4,000 square feet of asphalt and to introduce a garden that includes native shade trees, shrubs, flowers, and grasses at Wilshire Park Elementary School;[19]
- Council for Watershed Health's previous collaboration with LAUSD to transform asphalted schoolyards at five schools into water-conserving landscapes and current work leading the design for greening projects at eight additional LAUSD schools;[20]
- Los Angeles Neighborhood Land Trust's work to green schoolyards in five LAUSD schools located across Central and South Los Angeles;[21]
- Los Angeles Living Schoolyard Coalition's work to increase green shade infrastructure and water conservation in schools across the region, as part of its broader efforts advocate for equitable and healthy school environments since it convened in 2019;[22]
- Nature Nexus' installation of native plants at schoolyard habitats in Leo Politi and Esperanza Elementary Schools in LAUSD;[23] and
- Los Angeles Neighborhood Initiative's work to remove over 29,000 square feet of asphalt and create natural outdoor learning and play spaces at Baldwin Hills Elementary School.[24]

At the state government level in California, recent school greening efforts have included:

- CAL FIRE allocating $150 million in greening efforts at Transitional Kindergarten (TK)–12 public schools and nonprofit child care facilities through its Urban and Community Forestry Program[25] — $31 million of which was provided through federal Inflation Reduction Act funding and almost $7 million of which CAL FIRE has allocated to "strengthening the California Schoolyard Forest System";[26]
- California Department of Parks and Recreation allocating almost $42 million to school greening projects through its Statewide Park and Community Revitalization Program in 2023;[27]
- A state action plan to build resilient communities released in 2022 that promotes further study about the climate resilience implication of shade trees, their installation in schools and other common spaces, and acknowledges schools as key sites to implement climate-smart planning against heat vulnerability;[28]
- The Cal OES California State Hazard Mitigation plan developed in 2023 acknowledging that "communities can suffer significantly from natural hazards if they are under-invested in, under-targeted for, or excluded from community investment in green infrastructure and other nature-based solutions" and promoting urban green infrastructure "such

as urban tree canopies, rain gardens, and green roofs can assist in stormwater management and reduce the impacts of extreme heat events and drought events";[29]

- And proposing and considering legislation to encourage school greening projects (e.g., AB 2600, a proposed bill that supports urban forestry school greening projects).[30]

Locally, within LAUSD, school greening efforts include:

- Integrating the following language in its *School Design Guide* since 2006: "The LAUSD 'Greening Program' recommends the use of lawn and planting trees on at least 30% of the outdoor space on each school site and/or the installation of features that convert a schoolyard into a more environmentally friendly space";[31]
- The district board approving a resolution "Creating New School Gardens and Campus and Community-Shared Green Spaces to Provide Outdoor Learning Opportunities and Create Sustainable and Healthy Environments" in 2020 and a Green Schools for All Resolution in 2023;[32]
- The board adopting a recommendation for 30% green/natural space on campuses as the minimum standard for all district schools and directing the district superintendent to develop a plan to ensure at least 30% of the existing hard-surface schoolyard is converted into safe and sustainable green space at all schools in 2022;[33]
- District officials securing and allocating $450 million to schoolyard greening efforts districtwide, including creating outdoor learning environments, sustainable learning gardens, and depaving projects to support the development of natural schoolyards;[34]
- The district developing a Greening Index that helps identify which schools are most in need of greening resources;[35] and developing and releasing the district's Green Schoolyards for All Plan (2024), which establishes a goal of 20% shading by trees of each schoolyard within the district in alignment with California Green Building Standards Code (CALGreen) and the Collaborative for High Performance Schools (CHPS);[36]
- Approving the largest bond ever proposed in the district, Measure US (The Local Public Schools Safety and Upgrades Measure), a $9 billion school construction bond that will support school modernization projects, including efforts to expand and enhance outdoor spaces;[37] and
- Working with various nonprofit partner organizations to secure approximately $47 million in schoolyard greening funds through the CAL FIRE Green Schoolyards Grant Program.[38]

Local schoolyard greening efforts in other regions of the state include:

- Pasadena Unified School District Green Schoolyard Coalition, an independent civic group, successfully lobbying the district to include green schoolyard provisions in the recently approved Measure R, a $900 million school facilities bond;[39]
- Berkeley Unified School District (BUSD) establishing 17 gardens and half a dozen schoolyard forests across its 17 campuses, whose ongoing maintenance has been funded through a citywide parcel tax since 2000;[40]

- Oakland Unified School District (OUSD) launching a comprehensive living schoolyard Initiative in 2017, enacting a school board policy, BP 7110.1 (Development of Living Schoolyards), outlining the district's vision and plan for building living schoolyards at all OUSD campuses in 2019, and including a chapter on maintenance living schoolyards program in its Facilities Master Plan in 2020;[41]
- San Francisco voters continually approving investments to establish and expand the 60-plus green schoolyards across the San Francisco Unified School District (SFUSD) through local school facilities bonds over the last two decades, resulting in approximately 90% of schools in the district featuring outdoor classrooms, green infrastructure, and/or nature play spaces;[42] and
- Sacramento Tree Foundation supporting schoolyard greening in the Sacramento region by installing shade trees in schools through its Community Shade Program with funding support from the Sacramento Municipal Utility District and the American Recovery and Reinvestment Act (ARRA) (Figure 1).[43]

The programs, policies, and funding streams that have been established over the last two decades represent significant state and local government investment in schoolyard greening and signal that schools have been recognized as strategic institutions to cultivate green heat resilience infrastructure.

FIGURE 1

Established Trees Five Years after Initial Planting at River Valley High School in Yuba City Unified School District (YCUSD)

The Sacramento Tree Foundation supported tree plantings across Greater Sacramento through its regional Greenprint initiative with ARRA funding administered by California ReLeaf. Source: Anne Fenkner (2015)

1.2. Aims of This Report

Despite the increasingly supportive policy and cultural environment for schoolyard greening at the state and local levels, a key barrier to these projects is a majority of the school grounds in California's public K–12 schools are landscaped with asphalt or other hard surface materials (Figure 2).[44] As a result, schoolyard greening projects involving hard surface removal can, in many cases, trigger cascading project costs and administrative barriers to securing proper permitting and other clearances that eventually make projects cost prohibitive. Subsequently, project timelines are extended, project scopes are expanded beyond feasibility, and/or projects are suspended or canceled altogether.

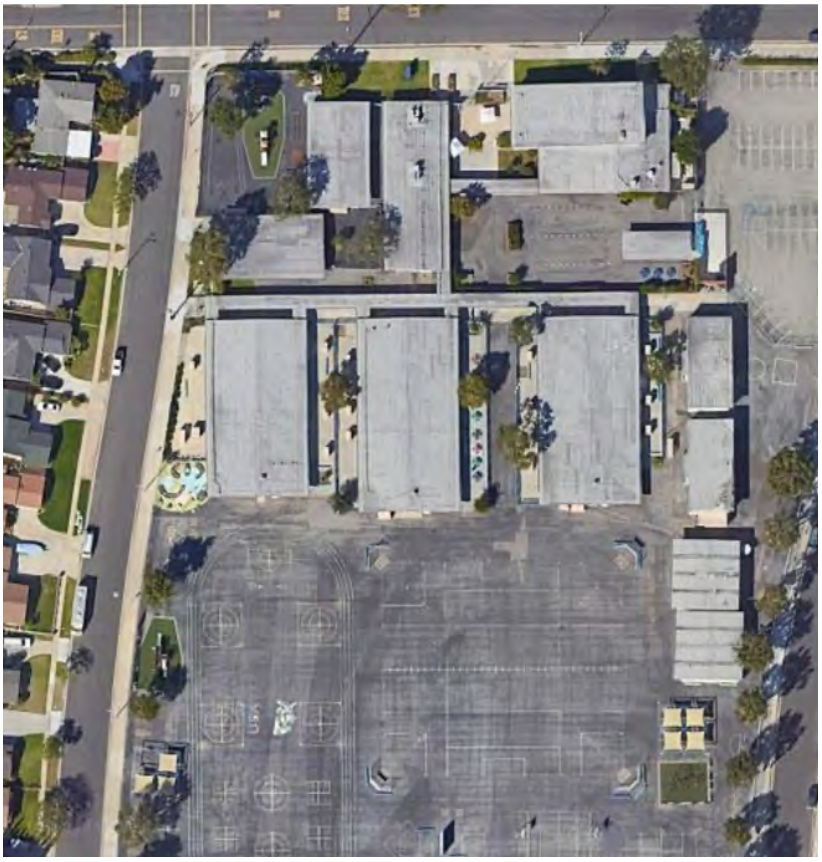
This report aims to provide a preliminary understanding of both the policies and the larger sociocultural factors that have contributed to the extensive amount of hardscaped ground surfaces in California public K–12 schools, to explain the factors that continue to encourage and reinforce the presence of hardscape surfaces in schools, and to illuminate potential actions that could further shift California toward depaving more of its school grounds to make way for schoolyard greening projects in the future. The report explores policy and other historical developments broadly in California and specifically within the Los Angeles Unified School District (LAUSD).

The central research questions addressed in this report were:

1. What policies, practices, and other factors contribute to the extensive asphalt and other impervious surfaces in California K–12 public schools?
2. What policies, practices, and other factors may be keeping the existing impervious surfaces in place?

FIGURE 2A&B

Examples of Schools Covered by Asphalt in LAUSD



A. Satellite view of Van Deene Avenue Elementary School in 2021 illustrating campus layout consisting of one-story buildings and extensive impervious surface cover. Source: Google Earth (2024)

B. An elementary school with an extensively hardsurfaced playground. Source: Sharon Danks, Green Schoolyards America (2024)

2. METHODS

This report relied primarily on research collected from July to November 2024 through a literature review and other desktop research. Google Scholar and Web of Science were the search engines used to locate academic literature, while Google Search and Bing Search were used to find additional academic and gray literature, which included reports produced by nongovernmental organizations (NGOs) and government and policy documents. Practitioner colleagues also provided guidance toward particular policies and feedback on report drafts (see Acknowledgements).

Categories of likely policies, practices, and factors were identified based on previous research about challenges and opportunities for schoolyard greening in California,[45] including: physical education policies in schools, public school funding mechanisms and their impact on school maintenance resources, the impact of educational priorities on school campus design, and the types of grant and funding opportunities that have been used to support schoolyard greening efforts. Keyword combinations were used to search for relevant literature related to the aforementioned categories. They included but were not limited to:

- For the history of landscaping on California public schools: “California public schools,” “asphalt,” “impervious surfaces,” “school surfacing”
- For background on California’s public school funding system: “education budget,” “maintenance and operations,” “school facilities,” “school operations”
- For background on how physical education requirements developed in California public schools and other information about California’s public education priorities: “California elementary school physical education (PE) requirements,” “history of physical education”
- For experiences with accessing external grants and funding opportunities: “California schools stormwater,” “LAUSD stormwater”

The final list of sources include: academic journal articles, theses, and dissertations written by master’s and doctoral students in architecture, education administration, general education, and physical education graduate programs; federal, state, and school district laws and guidelines (i.e., California Code of Regulations); white papers and reports produced by government agencies, nonprofits, and other nongovernmental organizations; and news articles.

The information synthesized from these sources were analyzed to produce a historical analysis of how asphalt became pervasive on California’s public school campuses and a policy analysis of the factors that keep asphalt and other impervious surfaces in place in the present.

3. FINDINGS

FIGURE 3

Timeline of Select Federal, State, and Local (Los Angeles) Policies and Events Influencing the Prevalence of Asphalt and Other Impervious Surfaces in California Schoolyards

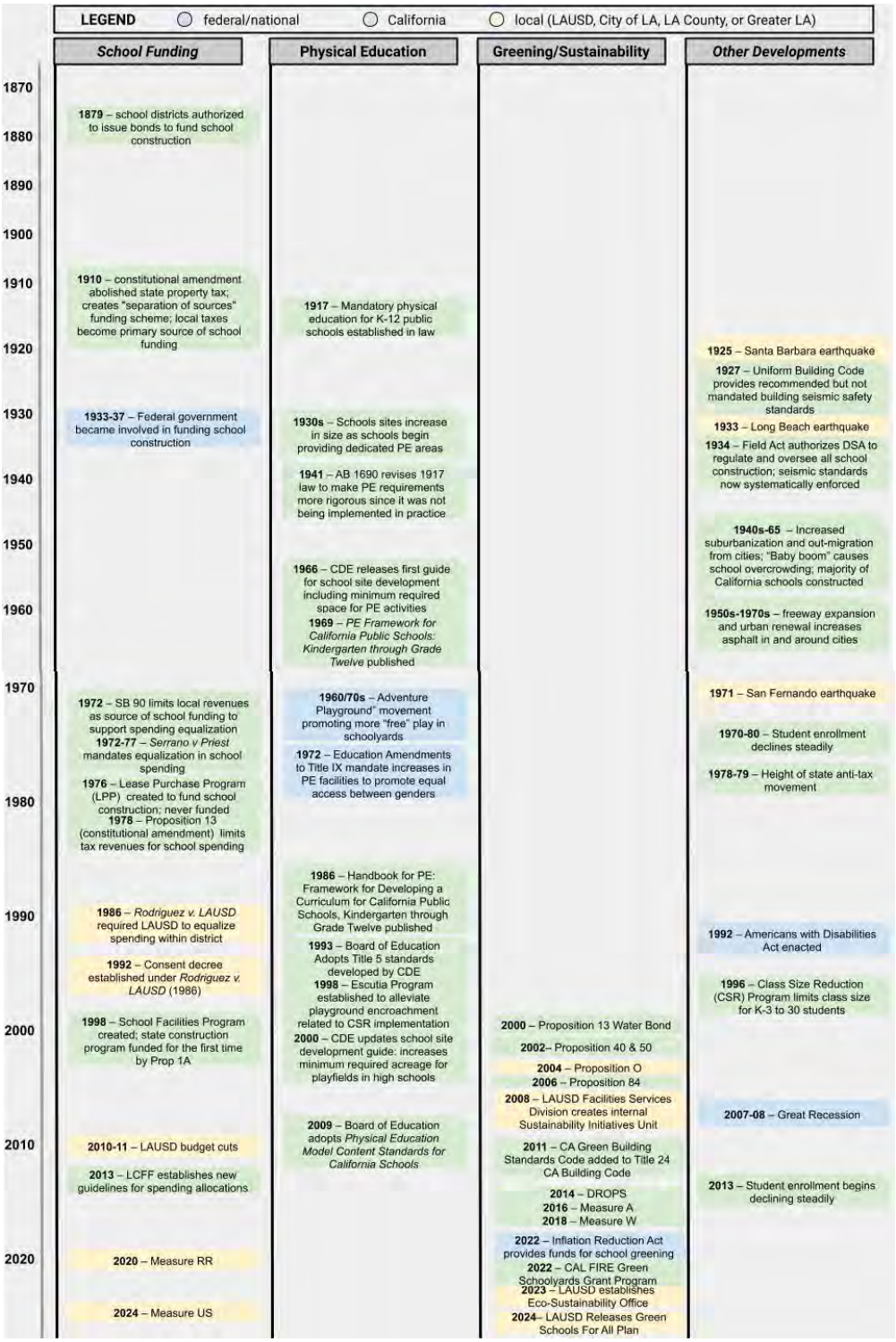
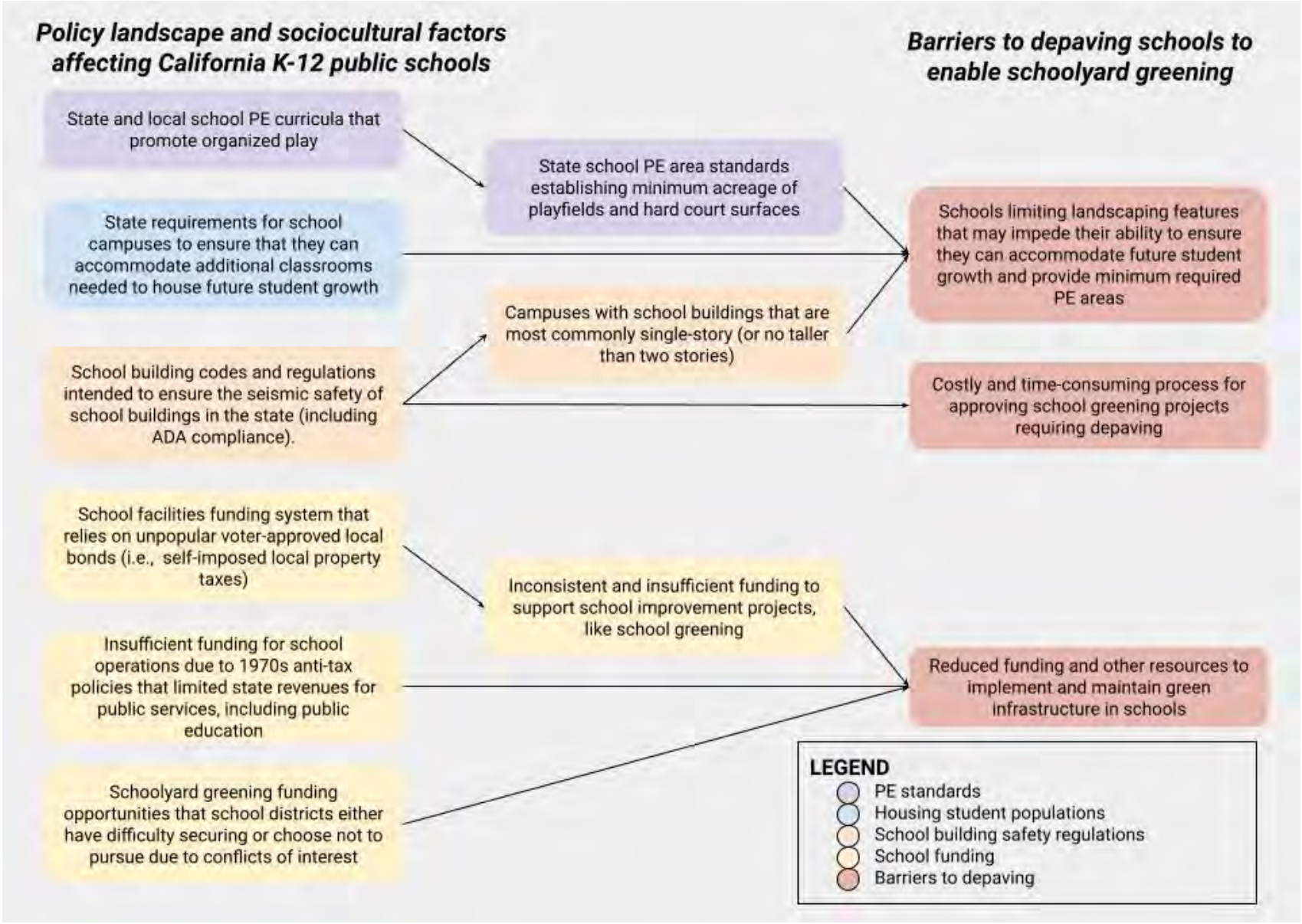


FIGURE 4

Overview of Key Policy and Sociocultural Developments in California's K–12 Public Schools That Have Affected Schoolyard Greening Efforts



This figure consolidates some of the major policy and historical developments affecting California K–12 public schools in the timeline presented in Figure 3 to illustrate how they have affected schoolyard greening efforts in schools today.

3.1. Why Are Many California Schools Hardsurfaced?

3.1.1. Open Air, One-Story California School Campuses: Designed to House Fluctuating Student Populations

Most K–12 public schools in California are designed as one-story, open-air campuses without indoor hallways. There were exceptions to this overarching pattern in denser and older cities, like San Francisco, where land scarcity likely necessitated multistory school buildings. However, in general, compared to the multistory, indoor schools in other regions of the U.S., many student activities (e.g., lunchtime and physical education) in California's schools take place in outdoor facilities (Figure 4). This school campus design is the product of a combination of several consistent and recurring factors over the past century: concerns about student health and development, California's once relatively temperate climate, the seismic safety of school buildings, and the need to accommodate student overcrowding in schools.

Open-air school campuses were first popularized in the state during the 1900s to 1910s. The Progressive Era movement's focus on the health of school children during this time period contributed to a shift away from multistory "big block" school buildings featuring internal hallways to one-story buildings constructed with ample windows that allowed for more access to natural sunlight and proper air ventilation.[46] The movement advocated for similar reforms to housing and working conditions in factories more broadly for the general population nationwide.

Until the last few decades of more persistent and extreme weather events, the relatively mild climate in the coastal areas where most Californians live made open-air school campuses a sensible design choice — particularly for Southern California.[47] The expectation that students would not need to rely as much on interior spaces for (1) shelter from the elements and (2) fresh air that could be more easily accessed in outdoor spaces compared to students in states with more severe climates (e.g., year-round precipitation, harsh winters, frequent storms) may also explain why the state requires a lower space-per-student minimum than most other states in the U.S. (Table 1).[48]

TABLE 1

Population Density of Schools: Median Square Footage of Indoor School Building Floor Space Per Student (2006 to 2007)[49]

Geography	Elementary Schools	Middle Schools	High Schools
California	73	80	95
Western Region (California, Nevada, Arizona, and Hawaii)	88	106	120
United States	122	144	167

The state began revamping its building codes between the 1920s and 1930s after two major earthquakes: the Santa Barbara earthquake in 1925 and the 1933 earthquake in Long Beach. The Field Act (1934), a state law enacted in response to the 1933 earthquake, imposed more rigorous seismic safety standards for school buildings that shorter buildings were most likely to satisfy. The City of Los Angeles Board of Education also subsequently revised its school building codes to stipulate that elementary school buildings could be no taller than one story while middle and high school buildings could not exceed two stories.[50] However, the city's school building height limits would change over time as simultaneous increases in student population and lack of adequately sized lots during the post-World War II period made compliance challenging, if not infeasible.[51]

At the same time, California's large land base and the availability of undeveloped land to build schools when the school system was maturing between the early- to mid-1900s made open campus designs feasible. The acreage requirements for this type of campus design resulted in new schools often being built in the expanding suburbs at the periphery of urban centers.[52] For example, the lot size requirements imposed by the Division of Schoolhouse Planning[53] led to the majority of new schools constructed during the 1940s and 1960s being located in suburban areas where land was more readily available.[54] This pattern of new school construction concentrated in the suburbs would continue to hold in the following decades as new schools were required to house a growing student population whose families were settling in the suburbs in increasing numbers.[55]

Being able to cost-effectively construct schools that could house shifting future student populations has been one of the most influential factors in the evolution of California's school campus designs. California schools have faced recurring periods of student overcrowding since the early-1900s.[56] Because the seismic safety standards under the Field Act — and local school building codes, like in the City of Los Angeles — often restricted school building height, schools could only expand outward — rather than vertically — to accommodate the classrooms needed to house additional students. The state, school builders, and architects have also been inclined to maintain single-story building designs, despite acknowledging that multistory buildings would be more effective at accommodating new student growth.[57] As a result, the state has strategically utilized one-story open-air campus designs throughout the decades to relieve present enrollment issues and to prevent future student overcrowding — to varying degrees of success.

During the 1940s, "community schools" — those housed in buildings with adaptable formats to serve multiple uses and to be accessible to the wider community — became highly influential in school campus design. This concept coincided with post-World War II architectural influences favoring modular, streamlined designs using cost-effective materials, like concrete, and that could be quickly and cheaply constructed.[58] This campus design was particularly popular in Southern California, given that it could accommodate school expansions easily as student enrollment grew.[59] During this period, the National Council on School House Construction, an organization focused on planning and designing school facilities, also advocated for one-story school building designs as a cost-effective design choice to accommodate future student population growth.[61]

The flexible open-school campus planning model that rose to prominence in the post-World War II era remained popular well into the 1960s as the prospect of increasing student enrollment in future years and the lack of certain and consistent financing to support school construction required to accommodate larger student populations remained salient issues for California schools. As a dissertation on postwar U.S. school architecture explained: "Far from an arbitrary design choice, schools were usually compelled to 'under' build because of unrealized but projected increases in enrollment, financial constraints, or both."[62] Flexible, open-community school campus designs gained and maintained further support between the 1950s to the 1970s, in part due to the influence of school building advocacy organizations like the Educational Facilities Laboratories (EFL), a national nonprofit established in 1956 that "brought together educators, architects, manufacturers, and government officials" focused on promoting school designs to enhance public education goals.[63] The organization, a proponent of "large, open, flexible spaces that could adapt to changing educational needs," influenced the design of thousands of schools during the 1960s and early-1970s.[64]

Open-space school campus designs have readily accommodated the additional classrooms needed to address student overcrowding and class-size limits in California throughout the decades.[65] State law has required that a minimum proportion of classrooms in schools constitute portable classrooms ("portables") in order for school districts to raise and/or receive funding for school construction since the 1970s. The Leroy Greene State School Building Lease-Purchase Law (1976), known commonly as the Lease-Purchase Program (LPP), that the state enacted to provide school districts access to funding for school construction and improvements, required that all new schools receiving state construction funds be built with at least 30% portable classrooms.[66] The law was amended in 1998 to include language stating that school districts could not charge school construction fees to developers unless 20% of new school classrooms constituted portables.[67] Such laws reflect that, while California schools have relied on portables to temporarily house student overflow since the early-1900s, portables have gradually become a more permanent feature of the state's strategy to address student overcrowding.[68] Portables were instrumental to California schools' compliance with the Classroom Student Reduction (CSR) Program, a policy enacted in 1996 that limited K-3 class sizes to 20 students, during its inaugural years.[69]

Trees and other more permanent green infrastructure would likely have interfered with schools' ability to respond to shifts in student enrollment, including efforts to efficiently relocate portables within and across school districts, throughout the decades.

FIGURE 5A,B,&C

Examples of Portable Classrooms in California Public Schools

A. Portable classrooms near an outdoor seating area at Chabot Elementary School in Oakland Unified School District (OUSD), California. Source: Natalie van Doorn (2024)

B. Portable classrooms behind a hardscaped playground area in East Oakland Pride Elementary School in OUSD, California. The new playground installation in 2024 involved depaving, strategic tree plantings, and painted asphalt to reduce albedo (sunlight reflected by the ground). Source: Levon Bigelow (2024)

C. Portable classrooms surrounding an outdoor playground area in the Early Childhood Education Center at Parkway Elementary School in Sacramento City Unified School District (SCUSD), California. Source: Natalie van Doorn (2024)

Consequently, despite the open-space design of California school campuses, there is a notable lack of tree canopy cover. Approximately half of all students in California's K-12 public schools attend a school where there is virtually no tree cover on their school campuses.[70] The Council for Watershed Health completed a 2015 study of all of the elementary schoolyards in Los Angeles that found that 20% of all schools in the district are completely hardsurfaced with asphalt and without any trees.[71] Not much has been published about the considerations that factored into historical green landscaping design choices within and around school campuses in the state. Within the Los Angeles Unified School District (LAUSD), trees seem to have been historically concentrated in the front-facing areas of schools, where administrative buildings are typically located, to provide parents aesthetic pleasure rather than dispersed across other areas of the campus where they might have provided greater benefits to students.[72] Today, this tree canopy cover distribution seems to be common in schools across many districts in the state.[73]

However, inferences can be drawn about how the state's top educational priorities over the past several decades — providing enough classrooms to support student population growth and accommodating minimum playground size standards — may have affected landscaping design and ground surface material choices in California's schools.

3.1.2. Historical Influence of Play, Physical Education, and Sports

Physical education (PE) and organized sports may have influenced the design of California's schoolyards and contributed to the high levels of impervious surfaces in schoolyards today. PE and organized sports are critical components of K–12 public education. Most California K–12 schools dedicate large portions of their school grounds to athletic facilities. The California *Guide*

to School Site Analysis and Development (2000) recommends for Grades 1 to 3 anywhere from 0.5 to 2.4 acres of a school site be dedicated to outdoor PE facilities, depending on the size of the school.[74] Likewise, the state also provides recommendations for types of PE "facilities," referred to as "teaching stations," which are designated play areas allowing individual classes to engage in different PE activities.[75] This section explores the historical development of PE and organized sports within California's public education system and how they may have influenced schoolyard design.

3.1.2.1. Preparing Students for Military Service and the Emergence of Organized Sports

A greater push for PE within the U.S. education system first emerged in the late 19th century as a result of the Civil War. Up to 50% of men who were drafted were rejected because they were physically unfit.[76] Physicians and exercise advocates recommended "a regime of systematic exercise in the school and home" as a solution to this problem.[77] Similar trends in subsequent wars inspired a greater push for PE in public schools. However, PE did not become mandatory for K–12 schools in California until 1917 as part of the state's contributions to the country's World War I efforts.[78]

The kinds of PE activities designed to prepare men for war might have influenced school outdoor facilities. In the early-1900s, some PE advocates believed the development of certain physical habits could instill in citizens desirable characteristics like bravery and endurance and thus promoted specific activities like baseball and football to develop these qualities.[79] They believed these traits were readily translatable to attributes that would serve men well during war.[80] During World War II, the Victory Corps, a federal voluntary program intended to prepare high schoolers for military service,[81] inspired PE programs focused on running, jumping, calisthenics, combatives, and obstacle courses, presumably for boys, and activities like speedball, tennis, and dancing for girls.[82]

Many of the aforementioned activities required a special court or field, especially organized sports like football and tennis. As a result, **the emphasis on preparing a population for military service through organized games and other physical education potentially increased the demand for fields and courts and possibly encouraged impervious surfaces** or grass fields — not trees — on schoolyards.

The design of schoolyards was also influenced by a general cultural emphasis on organized sports.

Organized sports came into prominence in the U.S. in the late 1800s with the invention of basketball and baseball. However, the organization of national sports leagues and the rise of athletic competitions between schools up to the collegiate level only began within the first few decades of the 20th century. In the 1940s, a National Advisory Board, established for the purpose of promoting civilian physical fitness, organized a Sports Board composed of 13 star athletes or activity experts for the purpose of promoting physical fitness.[83] Simultaneously, organized sports were emphasized in PE guidelines and recommendations for decades. The eighth edition of Dr. Jesse Feiring Williams' *The Principles of Physical Education* (1964) —

although originally published in 1927 to assist with the implementation of physical education and more focused on "natural play" activities[84] — still suggests that "Physical education should continue its efforts to make games, sports, and dance real forces in the American culture…[and] should continue to transmit the rich social inheritance of ideas in the folk dance…[and] in sports and games."[85]

Accordingly, throughout the 20th century, planning guides for recreational facilities appeared to undervalue the importance of natural recreational spaces. During this period, *The New Play Areas: Their Design and Equipment*, the 1938 edition of *Play Areas: Their Design and Equipment* (1928),[86] was written for the National Recreation Association,[87] an organization that provided recreational facilities construction guidance in the wake of the Great Depression.[88] This document states:

> "The team games and sports which, of the various types of physical education activities, education and medical authorities agree 'afford the best type of exercise both in respect to physiological effects, and to the possibility of a constructive contribution to the formation of social qualities in a democracy.' Essential to these activities…are areas and equipment for baseball, softball, volley ball, basketball, soccer, touch football and many other team games."[89]

Likewise, *A Guide for Planning Facilities for Athletics, Recreation, Physical and Health Education* (1947), produced by attendees of the National Facilities Conference, was intended to provide guidance to public officials and "technical specialists" when designing PE programs and recreational spaces.[90] The guide recommends facilities conducive to "tennis and other court games,"[91] demonstrating how the recommended PE curriculum is inextricably linked to the facilities that need to be provided for those activities. Civil engineers suggested that "ideas about the utility of outdoor space on school properties may also explain the dominance of schoolyard lawn, which can be used for organized sports" and further speculated that "the inclusion of trees on yards has likely come as an aesthetic after thought, resulting in low overall cover on most urban yards."[92] Hard courts are not mentioned here, but were likely also encouraged to provide necessary space for the recommended PE activities.

Within California specifically, though PE became mandatory for all K–12 public schools in 1917, schools did not begin providing dedicated PE areas for students until after the 1930s. The CDE's *Guide to School Site Analysis and Development* (2000) explains: "Before the 1920s and 1930s, school districts usually bought very small sites because there was little perceived need for outdoor play areas […] in the late 1920s and 1930s, there was a great surge of interest in physical education, leading to the realization that larger sites were necessary."[93] School sites became larger after the 1930s to accommodate dedicated PE facilities/areas. However, the CDE did not begin mandating minimum PE space requirements for schools until the 1960s.[94] The types of playground surfaces used in California public school playgrounds throughout this period is not well documented.

Post-1960s, the quantity of hard surfaces in California K–12 public school playgrounds may have also been affected by the implementation of Title IX of the Education Amendments

(1972). As the 2000 update to the California *Guide to School Site Analysis and Development* acknowledges, "Title IX ensures equal access for female athletes; therefore, the acreage requirements have been increased for physical education in grades nine through twelve to include additional softball/soccer fields." The required acreage increase was precipitated by a study the CDE conducted prior to the 2000s to evaluate whether schools were complying with Title IX 1972 amendments. The study found that approximately two-thirds of the surveyed school districts reported their field areas were inadequate to accommodate women's team sports. This was particularly true in larger schools with more students.[95] It is difficult to quantify the theoretical effect Title IX would have had on the proportion of school grounds available for trees and shrubs, as several other policies that may have affected schoolyard design were implemented between the 1967 and 2000 versions of the guidelines. These policies include Class Size Reduction (CSR) and federal Education Amendments of 1977.[96] Moreover, the *Guide to School Site Analysis and Development* is meant to advise new school construction, so the new acreage standards established post-Title IX would likely have only applied to new schools constructed after the 1970s — even though a majority of California's schools were constructed between 1950 and 1965. It is unclear how existing schools would have been expected to accommodate Title IX requirements.

3.1.3. Asphalt as Preferred Material on Playgrounds

Asphalt was first used to pave roads in the U.S. during the late-1800s, but did not become a more widely used ground surface material until the years prior to World War I. Asphalt enabled the country to build out transportation networks that would enable car travel and the speedy movement of goods.[97] Today, 94% of all U.S. roads are paved with asphalt.[98] Asphalt also became a popular ground surface material in schools throughout the 20th century as administrators across the country became increasingly preoccupied with how to properly surface school playgrounds. Across the decades, the determining factors for school administrators and playground designers in choosing schoolyard surfacing have included ensuring intensive year-round use, all-season and all-weather access, proper drainage and quick-drying surfaces amid wet weather conditions, and general ease of care for school maintenance staff.[99]

From the 1910s to 1930s, emerging concerns about how to properly surface school playgrounds to provide adequate but durable play areas coincided with the increased importance of organized play to encourage the physical fitness of school children.[100] The National Recreation Association (NRA) — an organization focused on the development of schoolyard and municipal playgrounds and fostering a culture of play in the U.S.[101] — drafted an "Outline for Playground Law" in the 1910s that became influential in American playground design in the following decades.[102] In the 1930s, the NRA recommended playgrounds intensively used by schoolchildren should be paved over with a "hard material, preferably of a bituminous nature [asphalt]."[103]

Both World War II and postwar environmental education design principles likely contributed to the increasing popularity of asphalt as a material to surface playgrounds in the following

decades. Postwar school campus designs reflected the militaristic, industrial, and productivity-centered design ethics of the period, which encouraged playgrounds that were "durable, low-maintenance and free of liability."[104] The National Council on Schoolhouse Construction published a guide in 1949 asserting that most schools would likely need to hardsurface a portion of their playgrounds. During the same period, the United States Housing Authority (USHA) — a federal agency established in 1937 as part of the New Deal to support low-cost housing construction — recommended the use of asphalt in schoolyards.[105] The majority of playgrounds built in USHA-funded projects were hardsurfaced, primarily as a means to keep maintenance costs low.[106] The National Association of Public School Business Officials also encouraged the use of blacktop surfaces in schools in 1940.[107]

However, **asphalt did not become a more common playground surface material until the midcentury when a majority of California's public schools were constructed (between 1950 and 1965).**[108] From the 1950s to the 1970s, schools across the country were encouraged by school building professionals and aspiring educational professionals to asphalt their playgrounds to provide a level, durable, and longwearing surface for students to play on throughout the school year.[109] In Southern California specifically, the terrain of many areas — consisting of hills, canyons, and valleys — prompted urban planners and school officials to urge the use of asphalt from the 1950s onward to create a smooth, relatively flat playing surface for school children in the region.[110] The rise of asphalt in schoolyards during this period coincided with urban renewal and freeway expansion in California[111] — both of which resulted in increased quantities of asphalt in cities more generally.

During this period, presentations were given at conferences hosted by and/or catering to school administrators (e.g., American Association of School Administrators) recommending asphalt as a ground surfacing material and emphasizing the importance of "simple" landscaping that prioritized ease of maintenance.[112] Moreover, it is possible that organizations, like the National Council on Schoolhouse Construction — which had been recommending asphalting school playgrounds for decades by this time — may have significantly influenced school administrator support for hardscaping school playgrounds throughout this period. Representatives from the National Council on Schoolhouse Construction and the American Association of School Administrators served together as committee members on the EFL (Educational Facilities Laboratories), a national nonprofit that was highly influential in shaping the design of school campuses during the midcentury[113]

It was not until the early 1980s that school administrators began questioning asphalt as suitable playground surfacing material. During this period, child safety on playgrounds became a paramount issue for school administrators, and playground surfaces were identified by researchers as the leading cause of the majority of injuries sustained on playgrounds.[114] From that period onward, asphalt was either deemed an inappropriate playground surface material or recommendations to hardsurface playgrounds seemed to be more conservatively limited to more contained areas reserved for organized games (e.g., basketball, handball).[115] However, this newfound awareness of asphalt as a safety hazard on playgrounds has not translated to more systematic action taken by schools to replace asphalt as a ground surface material in school playgrounds in the ensuing years.

The gradual paving over of schoolyards may also have been impacted by broader cultural preferences in the U.S. relating to perceptions of cleanliness and orderliness in cities. The little that has been written specifically about the history of asphalt as a material in U.S. schoolyards indicates that school administrators and, in some cases, community preferences prompted schools to hardscape their playgrounds. In Baltimore, advocacy from civic groups and the city officials — who were focused on enhancing the appearance of certain areas of the city — led to the paving of playgrounds between the 1950s and 1970s. Civic groups in Baltimore asserted that paved surfaces would provide more suitable recreational spaces for the community, even though some community members noted that children did not play in the spaces recommended for hardscaping and that asphalt also made these spaces a less welcoming play environment for them. Asphalt was also city officials' and school administrators' preferred material for playgrounds because it could be more easily and cost-effectively maintained during a period in which the city's tax base, and consequently funds to support school maintenance, was shrinking.[116] Within the (former) Anaheim School District in Orange County, California, complaints about dust and dirt on playgrounds from parents led to not just playgrounds but all areas around certain schools being blacktopped in the 1940s.[117] Concerns about dust led another school district in Long Beach in Los Angeles County to state that all playgrounds should be surfaced with asphalt or a similar hard surface material during the same period.[118]

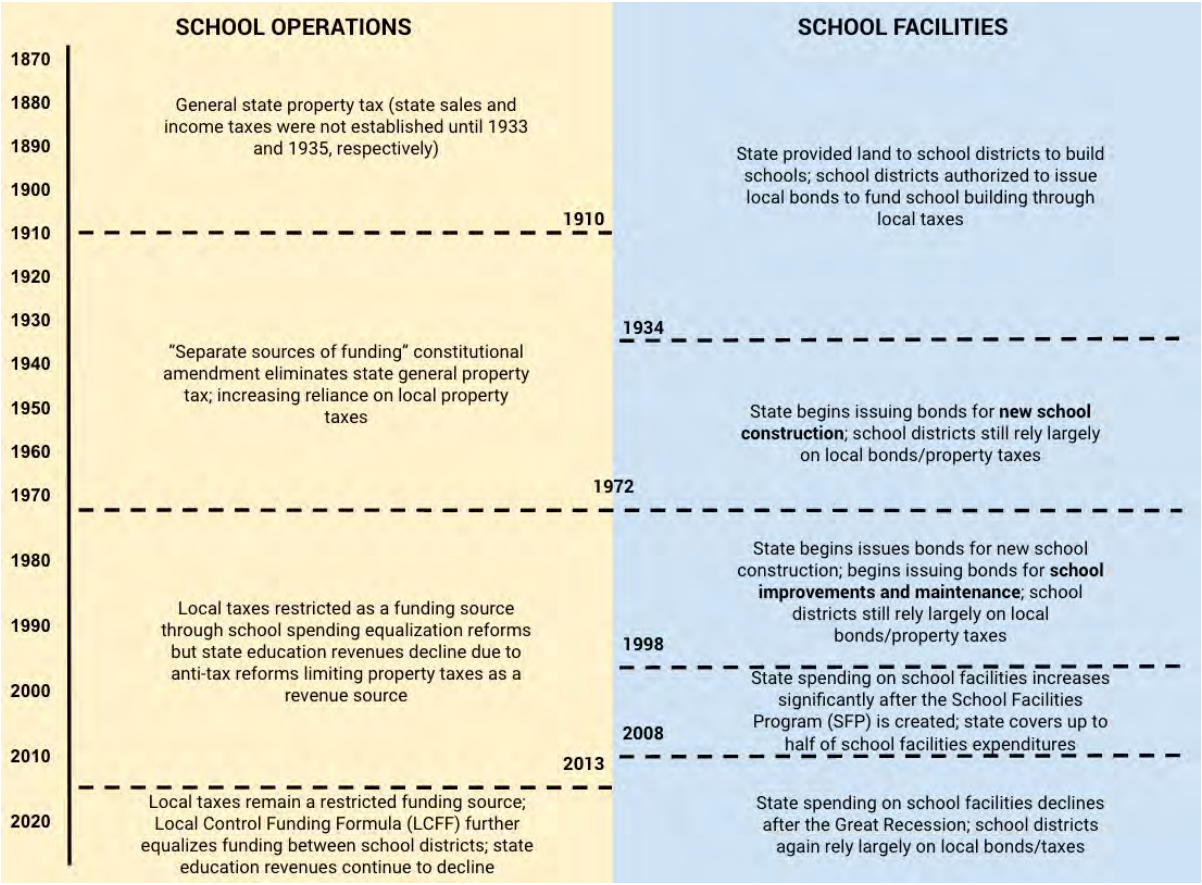
3.1.4. Under-resourced State School Facilities Funding System

The state's lack of a dedicated funding system to support the maintenance of California's school facilities has likely contributed significantly to school campus designs that have prioritized ease of maintenance. The funding system for school facilities in California developed separately from the system that resources school operations more generally (i.e., teacher salaries and other instructional resources) and has always been comparatively under-resourced (Figure 4).[119] School operations are currently supported through a combination of state income and sales taxes[120] and local property taxes that are collectively distributed to schools through state and local budget processes. State income and sales taxes also currently make up a larger proportion of school operations funding than local taxes.

However, **school facilities have never been treated as an ongoing expense with dedicated funding in annual state or local budgets. As a result, local school districts are often responsible for raising funds to support facilities with limited state support.**[121] **Spending on school facilities has required taxpayers to approve state and local bond measures for school construction and improvements, even though voters have often resisted levying taxes upon themselves to finance school construction.** As a result, state and local support for bonds — and funding for school facilities — have fluctuated widely across the decades.[122]

FIGURE 6

How Levels of State and Local Funding For School Operations and Facilities Have Changed Over Time in California



California's public schools have relied primarily on local bonds to finance school construction activities since the late 1800s.[123] School districts have been authorized by the state to issue local bonds to finance school construction since 1879.[124] While school districts received more than half of their revenues from the state (53%) in 1890, this figure dropped to 22% by 1920 due to a 1910 state constitutional amendment that abolished the state general property tax and effectively eliminated state property tax revenues as a source of school funding.

BOND FINANCING

Bond financing — general obligation (GO) bond financing — is a type of long-term borrowing that state and local governments frequently use to raise money, primarily for long-lived infrastructure assets. They obtain this money by selling bonds to investors. In exchange, they promise to repay this money with interest. They are used to finance large projects that otherwise cannot be financed upfront all at once. They are technically paid for through the State's General Fund, which is largely supported by tax revenues.[126]

California is one of several states that relies on bonds to finance state and local infrastructure improvements.[127]

The 1910 law was the product of a period during which experts, including tax and education spending reform advocates, and the general public had turned against the notion of education as a statewide public good requiring state wealth redistribution to finance it. They asserted that schools should rely primarily on local sources, since schools primarily benefit local communities. Public finance scholars and corporations interested in reducing their tax burden simultaneously advanced a narrative that reckless school spending (rather than inadequate state support) was the cause of the state's education funding deficits. However, such claims ignored that a growing number of community and civic functions — e.g., student health and social services — were assigned to schools.[128]

From that point forward, school districts were limited to taxing local properties while the state retained the sole authority to tax corporations.[129] However, the lobbying activities of corporations throughout the decades have ensured that the state has not exercised this power to its fullest potential,[130] and state-level funding for schools has remained limited throughout the decades. By 1925, 64% of education spending in the state was derived from district taxes while the rest came from the county sources.[131] As school districts relied increasingly on local (district) property taxes to finance education after the law was passed, inequalities in school spending widened between the 1910s and 1940s.[132]

The state did not begin investing significant resources in new school construction until the 1940s when a significant postwar increase in student populations statewide led to increased demand for new schools. California established the State Allocation Board (SAB), an agency responsible for approving all state appropriations for school building projects, in 1947 during the post-World War II school "building boom" between 1940 to 1960.[133] A majority of schools in California were constructed between 1950 to 1965 and have since been poorly maintained.[134] Moreover, despite these state investments, between 1910 to the mid-1900s, school construction was still funded almost entirely through local property tax revenues.[135]

The state enacted the Lease-Purchase Program (LPP) in 1976 to provide more funding for school districts to finance school construction and modernization. The LPP represented a significant change in how the state provided funding for school facilities. Instead of serving as a lender to school districts, it now issued funding as grants.[136] However, funding for the program was never actually approved as voters consistently rejected state bond measures to fund the program[137] — a dynamic that would come to characterize the state's school facilities funding system in the present. A backlog of school building projects in need of financing would persist into the late-1990s.[138] The LPP would eventually be replaced with a similar program meant to improve access to state funds for school construction, the School Facility Program (SFP), and properly funded for the first time through a voter-approved bond (Proposition 1A) in 1998.

Given the aforementioned history of how school facilities spending has been funded, while state per-pupil spending on school facilities fell consistently between 1960 and 1982, it rose dramatically beginning in the late-1990s.[139] Voters approved five state bonds that provided school districts with funds for school construction between 1996 to 2006,[140] and from 1986 to 2006, state school bonds also covered about half of school facility expenditures.[141] However, school facilities bond support declined once again post-Great Recession.[142] While California voters recently approved Proposition 2, a $10 billion school facilities bond to support modernization of K–12 schools and community colleges, in the November 2024 election,[143] they previously rejected a state school construction bond in 2020.[144]

Today, school districts in California, once again, rely primarily on local bonds to finance school construction, even though local school construction bonds remain unpopular to voters.[145] The Los Angeles Unified School District's Facilities Services Division (FSD), which oversees the maintenance and operations of the district's school facilities, relies primarily on funding from six local bond measures — Proposition BB (1997) and Measures K (2002), R (2004), Y (2005), Q (2008), and RR (2020) — to fund and implement its facilities construction and maintenance work. Local and state matching bonds provide over 90% of the funds for the School Upgrade Program (SUP) — the district bond program the FSD manages that finances maintenance and improvement projects across the district. Local bonds comprise close to 80% of total funds for the program.[146] Measure US, a $9 billion school construction bond — $1.25 billion of which will be allocated to schoolyard greening — was recently approved by Los Angeles voters in the November 2024 elections.[147]

Within the San Francisco Unified School District, voters have approved local bond measures in 2003, 2006, 2011, and 2016 — all named "Proposition A" — to support the district's facility construction program. The bonds have been used to support Americans with Disabilities Act (ADA) accessibility improvements, seismic retrofits and other school building renovations, playground improvement projects, and to expand and maintain the district's green schoolyard program.[148] San Francisco voters also recently approved a local $790 million school construction bond — "Proposition A" — in the November 2024 elections.[149] Voters in the Berkeley Unified School District have approved local bond measures A (1992), AA (2000), I (2010), and G (2020) to support the school construction and other capital improvement projects overseen by the

district's Facilities Department.[150] Measure Z, a $158.3 million school facilities bond to support modernization efforts in Encinitas Unified School District, was also approved by voters in the November 2024 elections.[151]

California has also generally provided less financial support to maintain existing schools than for new school construction. As previously explained, while the state has financed new school construction since the 1930s (post-Field Act), the state's official role in financing school improvements was not formally established until the early 1970s.[152] But with the exception of a period between 1970 and 1980,[153] **the state has dedicated a smaller proportion of overall facilities funding to maintaining its schools than for new school construction and has provided this support for a shorter period of time.** As a result, in 1995, a federal Government Accountability Office (GAO) study named California home to some of the most dilapidated schools in the nation.[154]

School construction bonds can only be used to finance capital improvements (i.e., school building construction activities) and cannot be used to fund the day-to-day maintenance of school facilities. Based on the history of both the state's school funding system and asphalt as a preferred surfacing material on playgrounds, **school districts in California have likely adapted to absent state support and precarious local support to maintain their school infrastructure by limiting the types of campus designs and features on their campuses that could tax their capacity to maintain them in the long term.**

3.2. What Policies and Practices Keep Asphalt and Other Impervious Surfaces in Place in California Schools?

The previous section outlined key historical and policy developments that led to the prevalence of asphalt in California's K–12 public schools. Over the past two decades, recent movements have emerged in the state, and the U.S. more broadly, to (1) promote more natural, unpaved play spaces for school children and (2) implement heat resilience and sun protection[155] infrastructure to mitigate the impacts of the climate crisis in schools. Both movements have been spearheaded and/or supported by schoolyard greening advocates at the national and local levels. Trees play a critical role in efforts to promote nature-based play environments and heat resilience and sun protection infrastructure in schools. However, the extensive amounts of asphalt on school grounds and various challenges related to depaving have created roadblocks to planting trees and other vegetation. The following section discusses the factors that make the extensive amounts of asphalt and other impervious surfaces in California K–12 public schools difficult to remove.

3.2.1. Rigid Notions of What Constitutes "Play" and "Physical Education"

The historical influence of organized play in public school physical education (PE) remains a major influence on the design of schoolyards in the present. It also remains a barrier to depaving and greening schoolyards. The **PE standards outlined in current state guidelines — last updated in 2009 — require students to demonstrate mastery over recommended, though not mandated, activities that often require impervious surfaces**, like courts or fields[156]

— for example, kicking or dribbling a ball[157] and generally "competitive ball sports."[158] While federal and state PE standards identify specific, but flexible, learning objectives, like the kinds of physical movements and games that students in specific grades should master, they do not specify the kind of facilities, including playground surfaces, that are required for such activities.

In the 2009 document by the California Department of Education (CDE), *Physical Education Framework for California Public Schools: Kindergarten Through Grade Twelve*, PE for K–5 students is expected to focus on cultivating basic locomotor skills, strength and cardiovascular exercises, ball manipulation, rhythmic movement, and flexibility.[159] Older students build on these skills through other activities that allow them to slowly advance toward more organized sports and games.[160]

National guidelines also demonstrate a tendency to suggest standards or activities that are usually practiced on impervious surfaces. For example, the Society of Health and Physical Educators (SHAPE) America produced the *National 2024 Physical Education Standards*, a guide for federal PE standards, which lists manipulation of a ball or similar activity (i.e., throwing and catching) in six of their 17 standards for pre-K through Grade 2, as well as several simple activities like jumping, jumping rope, rolling, and striking with tools.[161] SHAPE America is a national organization that provides support to — and works with — PE, health, and other recreational professionals and advocates[162] as well as state affiliate organizations. The standards they produce are meant to serve as guides, given that the development of PE curricula are locally controlled.[164] However, it is unclear if California has been influenced by SHAPE America's recommended PE standards. If the state (or its school districts) follow SHAPE America's standards, then PE standards may present barriers at both the local and national scale.

Recent studies on heat resilience interventions in California schoolyards also note that the CDE's *Guide to School Site Analysis and Development*, which sets requirements for how many hardsurfaced play areas must be available for different school sizes and grade levels, bases their requirements on state standards of play that are oriented toward hard surfaces.[165] Under these standards, schools with small outdoor areas might require all of its play surfaces to be hardsurfaced.[166] The actual amount of space allocated to courts and fields differs for each school depending on the number of and grades of students they are servicing, but the amount is not insignificant. For enrollment of between 151 to 300 students in grades 4–6, for instance, the guide recommends three apparatus areas of 3,200 square feet, four field areas of 32,400 square feet apiece, and four hardcourts of 8,000 square feet each.[167] This totals to 171,200 square feet, or nearly three football fields of space, dedicated to activities requiring hardcourts and fields.

Changes in the development of schoolyards across the state of California can be tied to this tension between organized and unorganized play. For example, Washington Elementary's schoolyard in Berkeley Unified School District has undergone a series of transformations as its school leadership's priorities have shifted.[168] The garden beds that the school originally planted in the 1920s were paved over in the 1950s,[169] but a third of the yard's pavement was removed in the 1970s. In 1971, the school established the Washington Environmental Yard (WEY), a natural

playscape with trees, shrubs, and two ponds that provided students autonomy to engage in a diversity of creative activities.[170] Largely due to the decrease in funding post-Proposition 13, support for the schoolyard declined in the late-1970s.[171] When the school underwent seismic retrofits in the mid-1990s, it reinstalled large quantities of asphalt to provide more space for ball games.[172] In 2013, the landscape architecture firm Bay Tree Design helped the school reintroduce more natural play features into its schoolyard, which involved depaving areas previously used as a basketball court. However, these areas were repaved soon after due to concerns about inadequate space for ball games — a decision that has also been attributed to "school politics."[173] WEY's history illustrates how a changing emphasis on what children need in their playscapes can radically change how schoolyards are constructed and, in particular, how an emphasis on certain types of sports and organized play in PE can serve as a major obstacle to more natural play spaces.

Beyond facilitating organized sports, concerns over student safety have also contributed to the prevalence of structured play and hardsurfaced playgrounds. As explained by an education scholar: "[T]he conventional approach to school ground design has favored flat, wide-open expanses of turf and asphalt with chain-link fencing, intended to contain and control students, facilitate supervision and promote competitive sports."[174] Schoolyards are generally designed with student safety in mind. However, these designs may simultaneously reduce opportunities for students to engage in freer, more creative forms of play.[175] For example, regulations may promote the removal of vegetation, like bushes, which may present potential safety hazards, but might also be playground features that provide hiding spaces for students to engage in more free play.[176] Physical education scholars also attribute the underappreciation for vegetation in play spaces to a lack of recognition of the importance of play in youth development.[177] Schools that continue narrowly focusing on accommodating organized, supervised play will likely choose to keep their schoolyards' pavement and turf in place.

3.2.2. Onerous Approvals Processes for Greening Projects Requiring Depaving

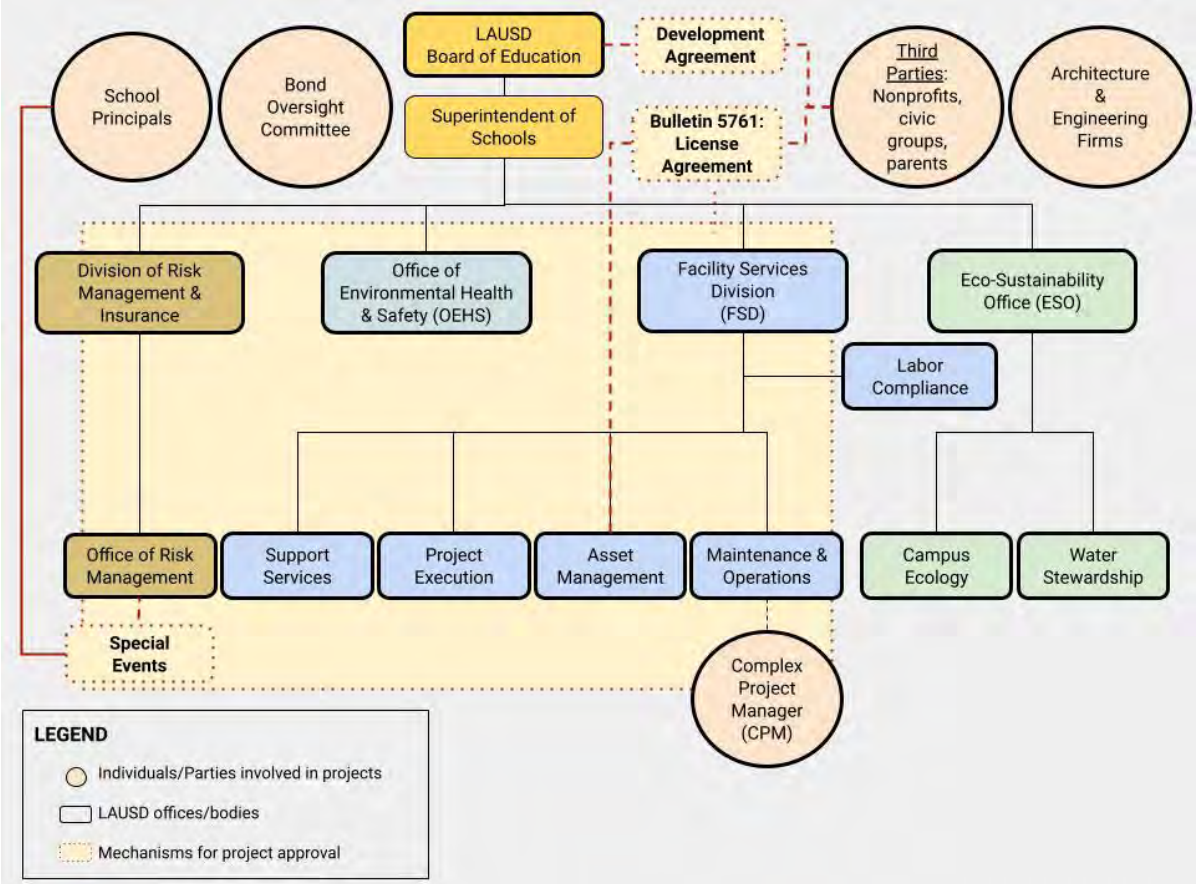
The approvals processes for large-scale school greening projects — like those that require depaving — are often time-consuming, and their onerous requirements can result in unanticipated costs that stall or cancel planned projects and discourage potential projects. This section also includes a closer examination of the processes involved in implementing school greening projects within the Los Angeles Unified School District (LAUSD).

LAUSD's Facilities Services Division (FSD) is responsible for administering the district's bond programs, maintenance and operations of schools, utilization of existing assets, and planning for future capital needs. Its directives and goals are outlined in the Strategic Execution Plan (SEP) it publishes annually.[178] The FSD has managed these programs under an umbrella program the district established in 1997 that, since 2014, has been referred to as the School Upgrade Program (SUP).[179] Until 2023, the FSD also housed all of the district's school garden and other sustainability initiatives.[180] LAUSD originally established the Sustainability Initiatives Unit (SIU) within the FSD in 2008 to support the development of a "green accountability system." However, in 2023, the district formally established the Eco-Sustainability Office (ESO)

as an independent office tasked with developing and implementing programs that support its sustainability goals. ESO houses the district's school greening and sustainability projects, overseeing six key sustainability focus areas — a few of which, including "Campus Ecology" in particular, feature greening projects.[181]

FIGURE 7

Parties Involved in LAUSD School Greening Projects



Proposed school greening projects must undergo a series of approvals within LAUSD before they can be implemented, but these processes vary with a project's scale and who initiates the project. Such processes are outlined in district policy via Bulletin 5761 (2012) and LAUSD's Green Schoolyards for All Plan (2022) (Figure 7).[182] All modifications made to school or office facilities through proposed projects, including greening projects, must comply with both LAUSD *School Design Guide and Guide Construction Specifications*[183] and California building and fire codes. When school greening projects are proposed by a school's principal, school principals must register through Special Events with the Division of Risk Management and Insurance Services.[184]

However, school greening projects initiated and funded by a third party (e.g., PTAs, parent volunteer clubs, nonprofit organizations) seem to involve a more extensive process. For smaller

projects that do not modify any infrastructure on school campuses, third parties must first work with the Facilities Asset Management branch to secure a temporary access license agreement. Subsequent approvals are coordinated primarily through two district offices — the FSD and the Office of Environmental Health and Safety (OEHS) — which must also review project proposals and authorize any construction activities prior to work being performed. The process is outlined as follows:

1. A written project proposal must be presented to the Site Administrator.
2. The Site Administrator will forward the proposal, including scope of work, to the Complex Project Manager (CPM), an FSD representative assigned to a school in a particular district service area. The CPM will then consider which other district- and state-level agencies need to be involved in the review process.
    i. Apart from routine maintenance projects,[185] all proposed projects need to be designed by a licensed Architectural and Engineering professional, and designs must be submitted to the district Project Execution and Design departments for approval.
    ii. If DSA approval is not required (i.e., the project is exempt), the CPM will initiate an alternate review process with the district Project Execution and Design and Inspection departments.
    iii. If DSA approval is required, the architect for the project must submit a copy of the proposal design plans to the CPM.
    iv. Once necessary approvals have been obtained, the CPM will notify the Site Administrator how to proceed with the project.
3. OEHS may need to review the project to determine if it complies with the California Environmental Quality Act (CEQA).
    i. The CPM must notify OEHS if the proposed project could directly or indirectly alter the environment in a significant way, triggering CEQA Environmental Impact Review (EIR).
    ii. For greening projects, the CPM will need to notify OEHS, so the office can provide guidance and oversight regarding the assessment of exposed surface soils.
    iii. OEHS will also need to approve any soil excavation or removal actions that may be required by the project.

School greening projects with larger scopes and budgets that require “soils/asphalt testing and site alteration/construction” (i.e., changes to school infrastructure) may require a Development Agreement.[186] The agreement is functionally a contract that seems to have been designed to cover project partnerships between the district and for-profit contractors and must be approved by the LAUSD Board of Education. Nonprofit partner accounts of their experiences negotiating Development Agreements[187] suggest that compliance with the terms set forth in the agreements — which may be poorly designed to accommodate nonprofits — may be onerous

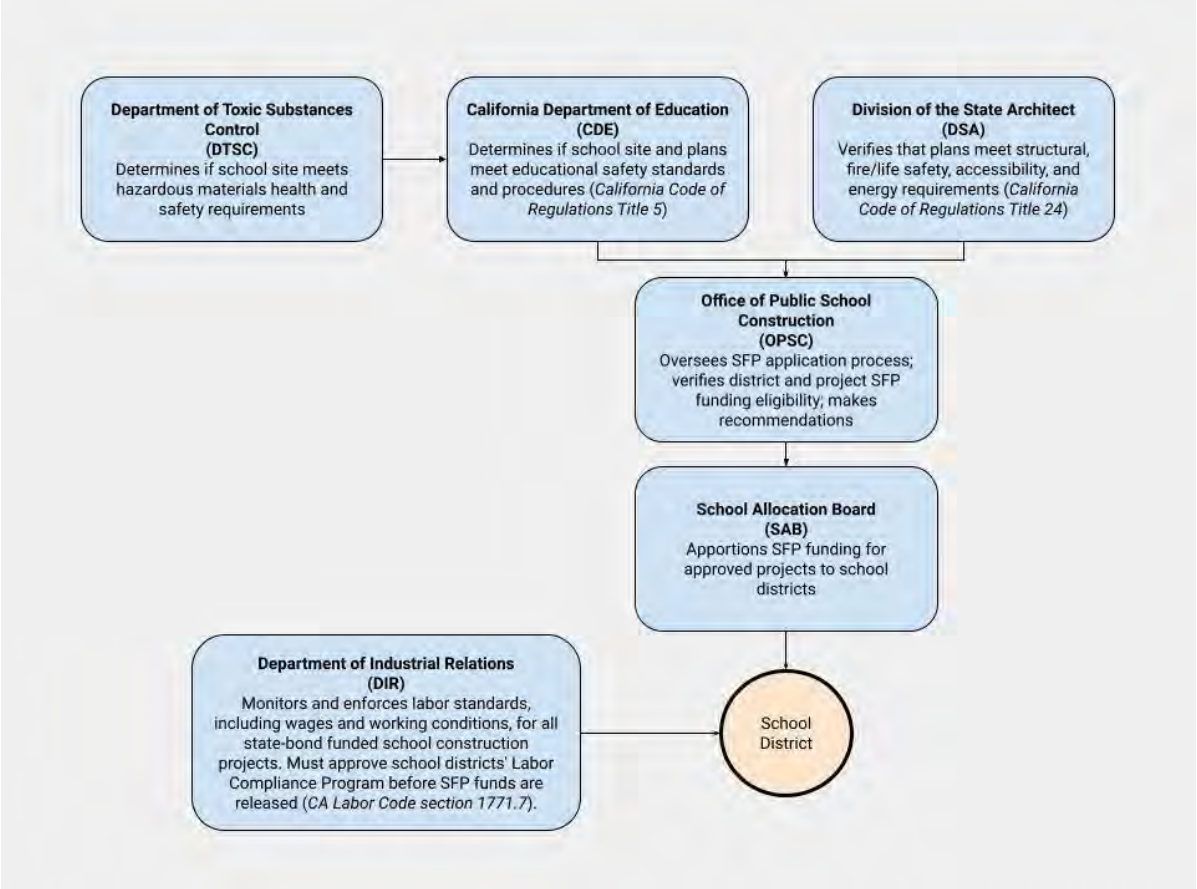
for third parties and may, therefore, discourage the implementation of greening projects that require depaving. Projects involving depaving are likely to require Development Agreements.[188]

It is important to note that these processes were developed and initiated during a period in which the FSD housed and oversaw all of the district's school greening initiatives. It is uncertain how the approval and implementation of greening projects through these processes — Bulletin 5671 and Development Agreements — will change as the newly established Eco-Sustainability Office becomes more fully integrated into its role managing and implementing the district's greening and general sustainability initiatives.

School districts also typically engage with a number of state agencies to obtain funding for new school construction and modernization projects (Figure 8). These include the State Allocation Board (SAB), the Office of Public School Construction (OPSC), the Division of the State Architect (DSA) of the Department of General Services, the School Facilities and Transportation Services Division (SFTSD) of the California Department of Education (CDE), the Department of Toxic Substances Control (DTSC), and the Department of Industrial Relations (DIR).[189] The DSA and SFTSD are responsible for ensuring school facilities comply with state facilities regulations (i.e., school building codes in Title 24 and school facility design standards in Title 5, respectively). Meanwhile, the OPSC and SAB oversee the application and approval process for schools to secure state school construction funds (i.e., School Facility Program funding) for proposed projects.[190] School districts must also receive approval from the DSA and CDE before they can submit funding applications to the School Facility Program (SFP).[191] School districts may be required to engage with none, some, or all of these agencies for proposed school greening projects, depending on the project's scope.

FIGURE 8

State-level Agencies Involved in School Construction Projects



The figure outlines a process in which funding for schoolyard greening projects is secured from the SFP program through the OPSC and may not apply to projects that are financed through other funding streams (e.g., CAL FIRE Urban and Community Forestry Program). Regardless of funding source, school districts may engage with any of the agencies depicted in the course of developing and implementing schoolyard greening projects. Adapted and modified from Figure 3 in California Department of Education School Facilities Planning Division (2008).[192]

School greening projects that require hard surface removal may trigger DSA review processes. There are three categories of DSA review — each with their own dedicated reviewer teams that are responsible for approving school project designs or plans: Structural Safety (SS),[193] Access Compliance (AC),[194] and Fire and Life Safety (FLS).[195] SS reviews assess projects for seismic and other structural building safety code compliance in accordance with the Field Act. AC reviews assess the extent to which projects meet accessibility requirements for people with disabilities, while FLS reviews assess projects for fire and other general building safety standards.[196]

Some greening projects, like garden installations in previously unpaved/underutilized areas of a campus, are mostly exempt from all DSA review processes. However, projects that require disturbing existing paved ground surfaces and, therefore, affecting accessibility — i.e., that

require asphalt removal — are considered "alteration projects" under the California Building Code (Title 24),[197] and require an AC review.[198]

The AC review the DSA oversees has been commonly identified as a key barrier to greening projects that require depaving. School construction projects that alter buildings or facilities more generally require that a "path of travel" through the areas altered by a proposed project be provided to comply with the state's ADA requirements. While state law (California Building Code Section 11B-202.4) limits the cost of providing a path of travel to 20% of the total project budget, project budgets that exceed a certain threshold do not qualify for this limit. They must ensure they can cover the cost of providing a "path of travel" regardless of the costs. The threshold was just over $195,000 in 2023[199] but will exceed $200,000 in 2024.[200] However, projects requiring depaving are likely to push project budgets over the limit.

Recent efforts have been made to expedite the DSA approvals process for school greening projects. In 2023, the state passed SB 515, which limits the cost of complying with the requirement to provide an accessible path of travel to 20% of the construction cost for all shade structure projects (Figure 9) regardless of total construction costs.[201] However, this law may not apply to greening projects, such as tree installations, since trees are not technically covered in the law's definition of "free-standing, open-sided shade structures included on the Division of the State Architect pre-checked designs list."[202] A more recent bill, SB 1091 (2024), that would expand the types of projects that qualify for the 20% cost limit to include greening projects has been signed into law by Governor Gavin Newsom. Such projects would include those that "[improve] community ecological health and climate resilience, or improve pupil well-being, learning, or pupil play, and that incorporate nature, including living trees, shrubs, and other plants, natural materials, and basic infrastructure, such as pathways and benches on school grounds to support pupil engagement in the space."[203]

FIGURE 9

Newly Built Shade Structure at Parkway Elementary School in Sacramento City Unified School District (SCUSD)

The structure provides immediate shade while newly planted trees mature, bringing promise of future living shade infrastructure. Source: Luisa Velásquez-Camacho (2024)

Certain greening projects may also trigger a full DSA review of an entire school campus. When proposed school improvement projects exceed DSA-established cost thresholds ($100,000), they trigger a comprehensive structural safety (SS) review of school buildings that may be impacted by the proposed project.[204] However, projects that exceed $100,000 but do not exceed $225,000 may be exempt from SS review if a licensed structural engineer can provide written assurances to the DSA that they do not include any work of a structural nature. This requirement is meant to ensure that when schools make significant financial investments to alter existing school buildings, any outstanding safety standard concerns for those buildings are correspondingly addressed. In other words, the **DSA might require a school to rehabilitate school buildings affected by a proposed greening project when the buildings are not up to code before the school can proceed with the greening project.** This unanticipated prerequisite can potentially expand the scope of a greening project and its corresponding budget to a cost-prohibitive level.[205]

Many California schools have a backlog of deferred maintenance projects — planned preventative maintenance projects that schools have delayed due to lack of funds — in large part because the state has not provided sufficient investments to support school facilities improvements (Figure 6). Thirty-eight percent of students currently attend California schools that do not meet the minimum facility standards (e.g., schools with damaged floors, walls, or ceilings; malfunctioning electrical systems; and underlying issues like gas leaks, power failures, and structural damage).[207] Consequently, **many schools seeking to implement greening projects that require depaving are likely to be burdened with additional mandated, cost-prohibitive building rehabilitation projects that they have not, and remain unable, to finance and complete**.

The DSA's outsized role in approving greening projects, particularly those that require depaving, draws from its directive to oversee all school facilities construction and improvements in California. The Field Act empowered DSA to design and enforce rules and regulations (i.e., school building design standards) necessary to carry out provisions of the Act — and, in effect, granted the agency oversight of all school construction and improvements in the state. The Act requires all public school buildings be designed by a California licensed architect or structural engineer and that all school construction activities meet the standards established by the DSA. Instead of coordinating with local building departments or concerning themselves with local building codes, school districts are required to seek approval through state agencies — including the DSA — to construct and improve their schools in accordance with "the special structural requirements for school buildings spelled out in California's Field Act."[208] The standards of compliance for the Field Act[209] are even more stringent than for either the Universal Building Code (UBC) or the International Building Code (IBC) — the basis for California's building codes since 2006[210] — covering most types of other buildings in the state.

Critics — including local school district administrators — have asserted that the state's school facilities systems' overly complicated approval process has impeded efforts to build and improve schools. The Little Hoover Commission, an independent state oversight watchdog agency that investigates state government operations and promotes efficient public services, stated in a 1992 report: "The state has created a cumbersome program that micromanages school construction projects, delaying the completion of and driving up the cost of school facilities."[211] In particular, Field Act compliance has been criticized for extending DSA plan review times and driving up project costs to an unreasonable degree.[212] The DSA has attributed some of the extended review times to the quality and completeness of initial plan submissions and the experience levels of architecture and engineering firms completing the submissions.[213] The agency has taken some measures to mitigate barriers that may be extending its review times, including completing "model Partnering Agreements" with select school districts, including LAUSD, San Diego Unified School District, and Los Angeles Community College District.[214] However, it is uncertain whether they have meaningfully improved the speed and efficacy of project plan reviews.

Because (1) school facilities construction and improvements are mostly locally funded, and (2) the facilities division of school districts often administer the programs implementing all

sources of school facilities funding, school district facilities offices hold significant influence over the planning and implementation of school greening projects. At the same time, due to the accessibility standards for school facilities outlined in Title 24 that were developed to implement provisions of the Field Act (which incorporate but also include more stringent features than federal ADA requirements),[215] the DSA's role in approving school greening projects will remain significant.

3.2.3. A School Funding System That Limits School Greening Efforts

Since school greening projects often rely on funding reserved for school improvements and renovations, it is difficult to secure state financing, particularly for greening projects involving depaving requiring larger capital outlays. Moreover, support from both school district facilities offices and grounds maintenance staff at individual schools is likely required for school greening projects to be approved and successfully implemented. However, they may be wary of the added labor demands and costs for maintaining greener campuses, and, therefore, reluctant to support school greening projects that require depaving.

Several features of California's current school funding system reinforce a systematic lack of adequate resourcing to both finance and complete school improvement projects, including school greening, and to support the necessary level of grounds maintenance staffing to sustain greener campuses in the long term. Key developments in the 1970s and the 1990s within California's bipartite school funding system — for (a) school facilities and (b) school operations — have produced these features.

3.2.3.1. Anti-Tax Movement Decreased State Funding for School Facilities and Operations

As previously explained, due to a 1910 constitutional amendment that abolished state general property taxes (the "separate sources of funding" amendment), localities have since only been able to tax property while the state collects taxes from other sources of revenue (i.e., corporate, income, and sales taxes) to finance education spending. The 1910 law contributed to widening school spending disparities between high- and low-wealth school districts and significantly reduced revenues for schools more generally. From 1910 to the 1970s, the majority of revenue for school funding was derived from local property taxes — between two-thirds to up to 95% of total funding.[216]

But beginning in the 1970s, school spending advocates sought to rectify the spending disparities produced by the "separate sources of funding" framework through spending equalization reforms. Their efforts produced key legislation and landmark court case rulings. Three California Supreme Court cases spanning 1972 to 1977, known collectively as *Serrano v. Priest*, held that California's school funding system, which relied heavily on local taxation, was unconstitutional because it discriminated against low-wealth communities. The cases culminated in the court ordering the state to take necessary actions to equalize school spending between school districts.[217] The California Legislature simultaneously enacted legislation in 1972 (SB 90) to establish revenue limits for public schools by restricting the ability of local agencies and school districts to levy taxes and declaring the state's intent to reimburse

local agencies and school districts for the costs of new programs or increased levels of service mandated by the state.[218]

However, these school equalization reforms coincided with a state anti-tax movement whose efforts produced policies that limited both the impact of spending equalization efforts and subsequent efforts to increase school funding more generally over the past several decades: Proposition 13 (1978) and the Gann Limit (1979). Proposition 13, a constitutional amendment that capped property tax rates and limited property assessment increases, effectively reduced local property tax revenues available to support education budgets. The policy led to large cuts to school operating funds in subsequent years — resulting in decreased funding for instructional resources (i.e., teachers) and maintenance and operations (M&O) at schools.[219] Proposition 13 also prohibited local property tax overrides — local taxes collected in excess of the limit — to help fund state general obligation bonds[220] and effectively shifted the responsibility for financing new school construction from localities to the state.[221]

Proposition 4 — commonly known as the Gann Limit — restricted property taxes and limited the ability of localities to raise revenues for public services by imposing an annual cap on the amount of funds that can be spent from state and local tax revenues.[222] The Gann Limit is one of several budget formulas that limit how the state can spend its revenues.[223] In years when California has a revenue surplus — revenues exceeding the cap/Gann Limit — the surplus must be split evenly between taxpayers rebates and allocations to K–12 public schools and community colleges.[224] While some research has suggested that the Gann Limit has not significantly impacted public spending over the past decades, it is predicted to impact spending in future years as state revenues are projected to increase.[225] The policy threatens the state's ability to sustain public services at their current level and may prevent it from making future public service investments, including school greening initiatives.[226] How the Gann Limit has affected school spending specifically over the years is less clear, in part because of the carve outs for public education when the limit has been exceeded and the subsequent passage of Proposition 98 (1988) and Proposition 111 (1990), which were intended to limiting the impact of the Gann Limit on school spending.

In sum, the spending equalization requirements established through *Serrano v. Priest* limited the amount of local funding school districts could raise,[227] while Proposition 13 limited the amount of state funding that could be directed to school districts with lower property tax wealth.[228] As a result, the state's current school funding system now features a number of procedures to more equitably allocate a shrinking pot of state and local school funds. Though state funding as a proportion of the total school spending has increased since the 1970s, total school spending has decreased overall. **The coinciding progressive school spending equalization and conservative anti-spending and anti-tax movements in the 1970s have forced school districts to rely increasingly on state revenues to finance schools, even while state revenues have declined dramatically. California schools have been unable to reliably secure funding to complete and maintain many facility improvement projects, including greening, given continually decreasing state education revenues, and school districts being unable to make up the shortfall due to spending equalization policies that restrict them from seeking other sources of funding.**

3.2.3.2. How School Facilities Are Funded: Reliance on Local Taxes

A. School Spending Reforms Ignored School Facilities Spending

As previously explained, the state's tax policies have forced school districts to rely primarily on local property taxes to fund school construction and improvements expenses. In theory, school districts rely on both local and state funding to finance operations and facilities — with the state's portion coming from income and sales tax revenues, while local funds are derived from property taxes. However, in practice, school facilities are mostly locally financed, while school operations receive more significant support from the state (Figure 6).

That school facilities continually receive comparatively less state-level support than school operations can be attributed to the fact that **efforts to promote equitable school spending over the past 50 years have been substantively focused on school operations**[229] **while neglecting to address the lack of funding for school facilities.** The Local Control Funding Formula (LCFF), enacted in 2013, represented one of the most significant changes to the state's K–12 education spending system since the 1970s, replacing the previous system which had been in place for 40 years. LCFF aimed to increase the flexibility and, therefore, efficiency of school spending by providing school districts access to more unrestricted funding (i.e., funds that do not have to be spent on particular expenses). It also provided a more equitable, need-based method of distributing state funds to school districts by directing extra school operations funding toward schools with a higher number of lower-income students.[230] Under the LCFF, all school districts are required to prepare a Local Control and Accountability Plan (LCAP), a comprehensive planning document describing annual goals, actions, services, and expenditures to support positive student outcomes that address state and local priorities.

However, no parallel policy/program has been enacted to equalize school facilities spending. Spending for school facilities continues to rely heavily on local property taxes — a source of funding that varies widely across school districts according to a district's property wealth.[231] At present, more than half of school operations funding comes from the state, and just under a third of funding is raised locally.[232] Meanwhile, local funding currently constitutes 84% of all school facilities spending.[233] Within LAUSD, some district staff have suggested that these state education budget flexibility reforms have resulted in funds that might have formerly been used for facility maintenance being redirected to other operational expenses.[234]

B. School Facilities Program (SFP) Reinforces Reliance on Local Taxes

The state pursued its most substantive effort to increase and equalize funding for school facilities through the School Facilities Program (SFP) in 1998. The program was established after a period — coinciding with efforts to increase and equalize school spending — during which per-pupil facilities spending in California fell consistently throughout the 1960s to 1980s (from over $800 to under $200 per student). Many school districts experienced subsequent facility shortages in the 1990s.[235] The state established the SFP to simplify the process of allocating state funds for school construction and improvements initially established through the LPP (1976) — the previous iteration of the SFP. The **SFP is currently the primary source of state**

funding for school construction and improvements, and is administered through several subprograms, including the New Construction (for new school buildings) and Modernization (for school repairs and renovations) programs.

While the SFP's creation led to a marked increase in school facilities spending,[236] **key features of the program have limited its ability to adequately support school facilities. These features may also adversely affect the availability of state SFP funding for future school improvement projects, including greening.** At its core, the SFP is meant to incentivize school districts to pass local bonds for school construction and improvements by promising matching state funds (i.e., state school facilities bonds). But in practice, lower-wealth school districts do not have the local property tax base that would allow them to raise enough local funds to qualify for state matching funds. At present, approximately 40% of school districts in the state are unable to raise sufficient funds through local bonds to cover essential school facility repairs.[237]

The SFP's outcomes also suggest that state-level resources for school greening have been and will be both limited overall and less equitably allocated in coming years. For the past two decades, the SFP has allocated higher levels of funding to wealthier districts with fewer high-need students. SFP modernization funding has been highly correlated with district wealth — with lower-wealth districts receiving nearly 60% less state modernization funding than higher-wealth districts since 1998.[238] Modernization funding appears to remain inaccessible to lower-wealth districts despite the modernization program being the only SFP subprogram with a lower threshold for school districts to qualify for state matching funds (60/40 state/local contribution compared to 50/50 for the other SFP subprograms[239]).

Moreover, the state's previous efforts to increase the accessibility of SFP modernization funding have fallen short. The SFP established a financial hardship subprogram that provides supplemental funding for school districts that cannot meet the 40% local match requirement to receive state matching funds for modernization projects. However, financial hardship funds have made up less than 3% of total SFP modernization funding over the past 25 years, and the amounts provided to schools are often too small to make a difference.[240]

In keeping with historical state school facilities spending patterns, more SFP funding has also been allocated to new school construction than to modernization projects since the Great Recession (2007–2009).[241] State law additionally limits the allocation of modernization funding to school buildings that are 25 years or older.[242] As a result, some school administrators have asserted that the state's funding model — in which **most resources seem to be dedicated to new construction while insufficient funding is provided to support school improvements** — often results in school facilities funding being "eaten up by ADA (Americans with Disabilities Act) upgrades, fire safety improvements, and small cosmetic changes, leaving less support for solid educational enhancement projects that are often desperately needed in older school facilities."[243]

Lastly, the state's bond authority, its ability to raise funds that support the SFP, have shrunken to an almost nonexistent level in recent years,[244] leaving school districts to continue financing most or all of its school construction projects through local sources. At present, the state

general funds supporting the SFP are running out, even as the state budget for fiscal year 2024-2025 released by Governor Newsom in May 2024 eliminates general fund support of the SFP in 2024-25.[245] The OPSC (the state agency that administers the SFP) has asserted that the state will exhaust available SFP funds by spring 2025 if it continues to apportion them at current rates[246] — and with it, necessary state funding to support school improvement projects, including campus greening.

Since school greening efforts financed through the state school facilities funding system are typically financed through SFP Modernization program funds, these trends indicate that there are and will be fewer overall SFP funds for school greening projects that are currently and will continue to be concentrated in higher-wealth school districts.

3.2.3.3. How School Operations Are Funded: Insufficient Support for Maintenance and Operations

School facilities projects often do not include planned outlays to fund their continued maintenance. Bond money for facilities construction often cannot be used to fund the day-to-day maintenance and operations (M&O) of facilities,[247] and schools are already struggling to maintain adequate funding to support existing levels of M&O. Identifying and securing dedicated funds to support the maintenance of greener schools will require reserving more operations funding to support M&O and/or increasing operations funding more generally.

State funding as a proportion of total funding for general school operations has increased since the 1970s. Since 1990, the state's share of K–12 school funding has hovered between 54% and 61%.[248] However, as previously explained, 1970s-era anti-tax policies (i.e., Proposition 13) have contributed to a steady decrease in absolute state school spending since that time.[249] While the LCFF increased the flexibility that school districts have to distribute the M&O funding in their budgets to meet local priorities after 2013, the overall decline in school funding over the past decades has translated to fewer resources for on-site facilities M&O. Due to decades-long state disinvestment in California's schools, there are likely now fewer M&O staff responsible for maintaining a growing stock of poorly maintained school facilities.[250]

Beyond overall funding availability, preferences for how school operations funds should be spent may also limit the resources allocated to M&O at schools. M&O for school facilities are typically financed through a school district's general operating funds. However, **the majority of school operations funding is often dedicated to teachers and other instructional resources**[251] and has been since at least the late-1880s.[252] Even the California Lottery, a relatively small source of school funding established in 1984, allocates 34% of all revenues to K–12 schools, colleges, and universities throughout the state but is restricted from allocating funds to noninstructional purposes, including facilities maintenance.[253]

Moreover, **M&O and instructional expenses have often been characterized as competing budget items within a school district's general operating funds**. The state Class Size Reduction (CSR) program (1996) — which limited class sizes for grades K–3 — has been attributed by some critics for creating overcrowding in schools that had sufficient capacity for

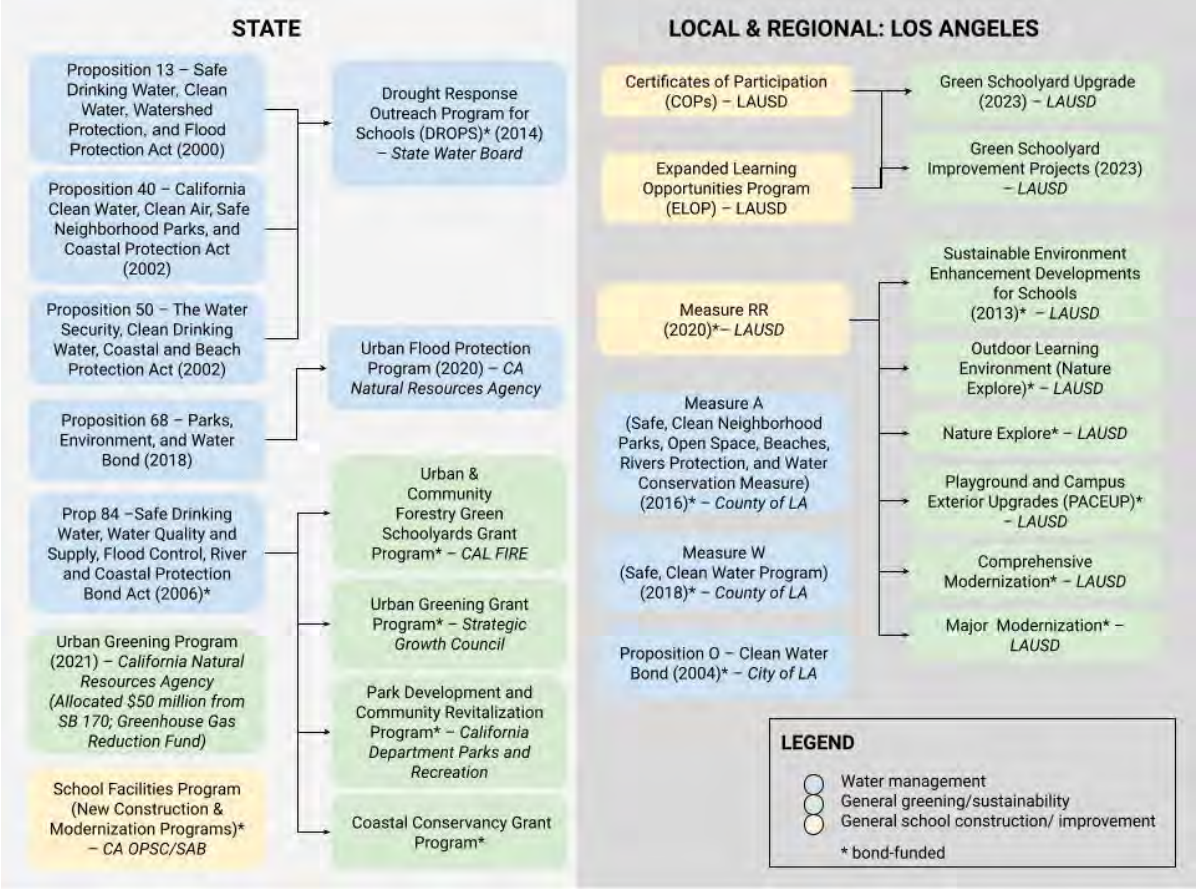
its existing student population prior to the policy's passage.[254] It has since also been criticized for exacerbating overcrowding in already overcrowded schools, given that it directs more resources to hiring additional teachers necessary to implement the policy, therefore reducing funds available to build new schools and to maintain existing school facilities.[255] On the other hand, school districts that serve a higher number of low-income students also tend to spend more of their operating funds on maintaining their schools, which can reduce the funding available to support students directly (i.e., teachers and other instructional resources).[256] In general, **budget cuts most often reduce facility maintenance programs first to mitigate their impact on instructional resources that more directly impact learning outcomes for students in the classroom. As a result, maintenance programs suffer disproportionately during education budget cuts.**[257]

Within LAUSD, budget cuts in 2010–11 compelled the district to respond by establishing its Safe and Clean Schools Initiative. The initiative encourages the wider community to be more conscientious about how they use school facilities to allow the district to maximize its more-limited custodial and maintenance resources. [258]

As school greening projects may require increased long-term maintenance on top of existing maintenance demands, the M&O staff who would be tasked with maintaining green infrastructure additions to schools may be reluctant to support these projects, and school districts may be reluctant to impose additional maintenance demands on their existing M&O workforce. LAUSD's recently published Green Schoolyards for All Plan (2024) acknowledges this reality: "To realize this ambitious goal of 30% green/natural schoolyards at all school sites, a significant investment in maintenance resources will be required to maintain and sustain this investment [...] approximately $12 to $15 million annually will be required. [...] In the absence of additional funding, M&O will continue to prioritize routine repair and maintenance funds to address priority service calls, and routine maintenance and repair of building systems and infrastructure that directly impact the safety of students and staff and the day-to-day operations of schools."[259] In fact, LAUSD has required the individual school sites and partner organizations for a number of school greening projects it has approved in recent years through its Sustainable Environment Enhancement Developments for Schools (SEEDS) program to complete "Maintenance Agreements" that provide for the ongoing maintenance of the newly greened sites.[260]

FIGURE 10

Funding Sources for School Greening Projects in California and Los Angeles



3.2.4. Stormwater Funding Opportunities: Inaccessibility and Incompatibility with School Priorities

As Figure 10 illustrates, while school greening projects can be supported through funding for general school improvement projects, a large number of other funding opportunities at the state and local level for school greening projects have been established over the last couple decades. Many of these funding sources are a part of larger efforts to support more efficient regional and state water management that may include school greening and/or depaving as potential co-benefits. This section focuses on examining the challenges that have prevented the Los Angeles Unified School District (LAUSD) schools from making widespread use of stormwater funding opportunities to fund school greening and depaving projects. It is important to note, however, that a few LAUSD schools have funded their depaving and greening projects through stormwater management initiatives, as discussed later in this section — demonstrating the broad potential for stormwater funding to support depaving efforts.

In the last several decades, several state and local programs in California have mobilized large amounts of money to support stormwater management initiatives. These programs include the

statewide Drought Response Outreach Program for Schools (DROPS) and Proposition 84, as well as local level initiatives like Proposition O and Safe, Clean Water Program (SCWP)/Measure W (summarized in Table 2).

TABLE 2

Select Stormwater Management Programs Funding Schoolyard Greening Projects in California and Los Angeles

Policy	Year	Jurisdiction	Description
Proposition O	2004	City of LA	This proposition raises funds for projects to help meet federal Clean Water Act requirements.[261]
Proposition 84 — The Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act	2006	California	This bond measure promotes safe drinking water, protects bodies of water, resolves water conflicts, and provides grants and loans to help provide drinking water and reduce water pollution.[262]
Drought Response Outreach Program for Schools (DROPS)	2014	California	This program, funded by Propositions 13, 40, and 50,[263, 264] finances stormwater management and water conservation projects. Projects must include an educational component.[265]
Safe, Clean Water Program (SCWP)/ Measure W	2018	LA County	SCWP funds stormwater capture and management projects in the LA County Flood Control District (FCD) and is financed via a parcel tax on most impervious surfaces within the FCD. The revenues are used to finance stormwater management projects via a competitive grant process.[266]

Despite the growing number of opportunities for schools to secure funding from stormwater management programs to support their depaving and/or greening projects, schools have not typically been able to benefit from such opportunities, either because their applications are rejected or they are choosing not to apply to or proceed with these funding opportunities. For example, schools' Proposition 84 grant applications have had a success rate of between 33% and 36%[267] compared to a rate of upward of 63% for other types of applicants.[268]

A 2015 study by TreePeople, an urban forestry nonprofit in Los Angeles, examined the barriers to successful stormwater program implementation in LA County, finding that stormwater programs faced strong resistance from a number of stakeholders in the county, including schools.[269] **The most common barriers to implementation included: liability and safety concerns, maintenance and funding issues, tedious and unclear application processes, differences in school district and stormwater program objectives, the reimbursement model of funding, and a lack of regulatory incentive.**

3.2.4.1. Liability and Safety Concerns

One of the major barriers to LAUSD pursuing stormwater funding has been a fear of liability — including fear of personal injury, damage to surrounding property due to ground subsidence, and concerns about public perceptions of the responsible use of public funds. The LAUSD Office of Environmental Health and Safety (OEHS) has been concerned about exposure to environmental risks and unmanageable maintenance and cleanup costs associated with stormwater program-funded projects.[270] Stormwater funding programs often require funded sites be willing to receive and process off-site stormwater.[271] The District has had concerns that this requirement or any handling of stormwater would potentially expose school grounds or surrounding properties to contaminated water that could trigger federal Superfund protocols. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)[272] is a federal law that establishes a "Superfund" to clean up sites exposed to hazardous waste and environmental contaminants and empowers the U.S. Environmental Protection Agency (EPA) to assign legal and financial responsibility for the cleanup of such sites.[273] LAUSD fears it could be held liable under CERCLA for cleanup costs if stormwater projects that accept off-site stormwater contaminate a school site and/or its surrounding areas.[274]

Moreover, LAUSD has, in the past, believed the California Department of Toxic Substances Control (DTSC) does not allow stormwater projects on school grounds due to concerns about exposure to potentially contaminated off-site stormwater, even though the agency has confirmed that it does not possess the authority to place blanket bans on stormwater projects on school campuses.[275]

3.2.4.2. Costs of Maintenance

School districts are also discouraged from pursuing stormwater management funding because of concerns about the costs of long-term maintenance for completed projects. The district has had issues with proposed projects not having long-term on-school site maintenance plans or being expected to provide long-term maintenance on some of the projects that have been implemented.[276] Moreover, water agencies "cannot… [legally] cover Operations and Maintenance costs on land they do not own."[277] The district has also had concerns about training and hiring the appropriate maintenance staff to service completed stormwater management infrastructure on school campuses. Some of these concerns around securing adequate M&O staffing may be related to the district's ability to honor labor agreements that "could prevent non-unionized LAUSD workers from performing maintenance on LAUSD grounds without prior approval."[278]

LAUSD was able to secure one Proposition 84 grant but later withdrew its application because of "capacity and administrative concerns noting it would not be cost effective for LAUSD to satisfy all the grant (funds transfer agreement) requirements."[279]

3.2.4.3. Confusing and/or Onerous Application Processes

Competitive grant processes and unclear application criteria may have discouraged and/or prevented LAUSD schools (and other schools in LA County) from securing schoolyard

greening funding through the stormwater programs. For example, when applicants apply to the Infrastructure Projects (IP) category of the Safe, Clean Water Program (SCWP), they are required to submit a feasibility study that may be onerous for schools to undertake.[280] The Watershed Area Steering Committee (WASC) — an entity established by the LA County Board of Supervisors to oversee their respective watershed areas and provide guidance on SCWP projects in those areas[281] — may also recommend that applicants who are not able to include a feasibility study in their application apply for technical assistance support through the Technical Resources Program (TRP) to help them prepare one.[282] Beyond support for feasibility studies, the TRP's technical assistance teams also provide support for applicants lacking technical resources to meet technical requirements and watershed coordinators for capacity building, engagement, and educational purposes.[283] Of 25 school-related project applications submitted between 2020 to 2024 (five application cycles), only three applications were for the TRP program and only one was for the Scientific Studies program.[284] Overall, the SCWP application review process can take approximately one year.[285] Similarly, Proposition 84 program applicants have also noted that the Proposition 84 application process was tedious.[286]

Confusing application processes and unclear project criteria may have also discouraged school districts from applying to certain programs.[287] Some stormwater funding programs featured a lack of transparency about the overall application and project selection process. Some nonprofit applicants felt they were "misled" during the application process for Proposition O funding.[288] Because Proposition O did not prioritize among its listed goals and did not provide specific language to guide the implementation of its stated goals, quantifiable pollution-reduction targets, or a framework for project selection, it fell to the Citizens Oversight Advisory Committee (COAC) — a seven-member body appointed by the LA County Board of Education (LAC BOE) that is responsible for overseeing the Proposition O expenditures process[289] — to develop an implementation process.[290] However, disagreement between COAC members led to unclear criteria for project selection.[291] For example, "Some COAC members felt that Proposition O was city money and could be used for just about any city infrastructure project, and others argued that Proposition O funds should be used primarily for projects that had direct water quality benefits."[292] Moreover, the selection process was not made transparent to the public.[293] The grant distribution process was also confusingly managed, with some nonprofits mistakenly believing their projects had been selected for Proposition O funding.[294]

Moreover, a lack of technical assistance (TA) to support school districts through these, at times, confusing grant application processes has also likely hindered their ability to secure funding through stormwater management funding programs. Some of these programs provided TA, like Proposition O, which offered engineering consulting services,[295] and Measure W, which provided TA for applicants of its TRP program. However, these resources did not seem adequate. In the case of Proposition O, the technical support did not receive enough resources to make a meaningful difference in the quality of the applications.[296]

3.2.4.4. Misaligned School District and Stormwater Program Objectives

Stormwater funding programs and school districts might also have misaligned priorities that challenge school districts' ability to secure stormwater management funding. A recent analysis of applications submitted by school districts for SCWP funding suggests that unlike project proposals that were funded, LAUSD's project proposals were not as clear about their outdoor education goals.[297] Additionally, LAUSD proposals tended to focus primarily on project objectives like asphalt removal while only discussing stormwater management as a side benefit.[298] SCWP seems to be more interested in funding projects that had a stronger stormwater management component than the projects proposed by LAUSD. It is possible that projects that emphasize impervious surface removal or greening without making stormwater management the central focus may struggle to secure funding from stormwater management funding programs.

Additionally, agencies administering stormwater grants may have been biased against proposals submitted by school districts due to the perceived limits of the benefits that stormwater projects based at school sites can provide. For example, some WASC members participating in the SCWP application review process expressed "concerns that [school] projects may not be 'green' enough or produce enough regional benefits."[299] Another WASC member asserted that a proposed stormwater management project based at Huntington Park High School in LAUSD affected an area that was too small in scope to have regional impacts and, therefore, did not warrant further consideration.[300] How points were allocated to SCWP applicants also reveals the way in which school-based greening projects may have been at a disadvantage. Community Investment Benefits — a benefit category in the application scoring rubric that includes school greening — can only contribute up to 10 of the 60 points a project needs at a minimum (of 110 total possible points) to qualify for funding from SCWP. In order to secure those 10 points, school greening must also be coupled with five other community investment benefits like "Improved public access to waterways" or "Reducing local heat island effect and increasing shade." The Nature-Based Solutions category can contribute up to 15 points and includes removal of impervious surfaces, usage of natural materials or vegetation, and restoration of green space, each of which can contribute up to 5 points.[301] The majority of points are concentrated in water quality benefits projects, reaffirming that schools that did not focus on stormwater management were likely disadvantaged in the application process.

3.2.4.5. Reimbursement Model

How grant programs set up their funding distribution mechanisms may have also discouraged school districts from pursuing stormwater program funding. Proposition 84 and DROPS operate on a reimbursement model,[302] meaning applicants whose projects are selected must finance their projects upfront and be reimbursed later for project costs.[303] This can make undertaking projects funded through these programs cost-prohibitive for some organizations that may have difficulty financing their projects upfront.[304] This is not unique to stormwater grants though, as California Department of Forestry and Fire Protection's Inflation Reduction Act-funded Community and Urban Forestry grants also primarily operate on a reimbursement model.[305] However, a model where funds are provided upfront might also create added administrative

burdens for school districts since they would then need to document their spending.[306] The DROPS program also explicitly prohibits the use of awards for indirect costs (e.g., overhead, contingency, or markup costs).[307] Many indirect costs that cannot be covered by grant program funds can be prohibitive for applicants with limited financial resources.[308]

Moreover, stormwater program funding may become a less viable resource for school districts to support depaving and general greening projects in the coming years. Some SCWP WASCs already allocated a significant portion of their Measure W funding during the first several rounds of the program and may have difficulty financing future projects.[309] The State Water Board reserved $5 million of DROPS funding for LAUSD project proposals but stipulated no additional funding would be made available to the district.[310] In total, LAUSD secured $6 million from DROPS and Proposition 84 to implement schoolyard greening projects districtwide.[311] The district used DROPS funding to incorporate features like bioswales, permeable pavers, and rain gardens at Normandie Avenue Elementary School (Figure 11), Northridge Middle School, Victory Boulevard Elementary School, and Daniel Webster Middle School[312] and Proposition 84 funding to support the incorporation of permeable pavement in parking stalls and bioretention areas at Markham Middle School.[313]

3.2.4.6. Lack of Regulatory Incentive

Not only is pursuing funds through stormwater management programs a difficult process for schools, but there is also little impetus from these programs to incentivize schools to pursue them. The federal Clean Water Act promoted the creation of a permitting system that includes Phase II Small Municipal Separate Storm Sewer System (MS4) regulations.[314] These regulations determine the types and quantities of stormwater runoff allowed by the permit holder.[315] In California, these permits are defined by the State Water Resources Control Board.[316] However, schools have not been required to comply with these regulations, due to economic and other factors.[317] Recognizing the important role that schools can play in stormwater management (research suggests that LA county schools alone could capture more than 2 billion gallons of stormwater a year[318]), numerous organizations have advocated for the inclusion of K–12 schools in the MS4 permits.[319] However, it seems unlikely that schools are to be regulated in such a way in the latest round of revisions.[320] Accordingly, advocates have been, and remain, worried that "without the pressure to comply with a protective MS4 Phase II permit, schools are insufficiently incentivized to pursue such funding for greening to address stormwater pollution."[321]

In a similar manner, schools are exempt from the parcel tax enacted by Measure W (through the Safe Clean Water Program),[322] meaning that, unlike other entities who can reduce their annual stormwater fee by removing impervious surfaces covered by the measure, schools are not financially incentivized to depave.

3.2.4.7. Other Barriers

Other barriers that are less immediately related to the design and application processes for stormwater management funding programs are also worth noting.

Some school districts may be incentivized to apply for funding from stormwater programs for already completed projects because undertaking and completing new infrastructure projects is not feasible for them. Larger infrastructure projects on school properties — like stormwater infrastructure — are often challenging to accommodate since schools tend to schedule construction activities when schooling is not actively in session. As a result, school districts are likely to avoid undertaking large voluntary school infrastructure projects.[323] Moreover, LAUSD is cautious about undertaking projects that may significantly alter the school's infrastructure and limit its ability to adapt school grounds to changing needs. The district also fears that such changes could potentially decrease the property value of school lands and limit their option to sell school properties in the future.[324]

The aforementioned barriers — fear of liability, the long-term maintenance costs related to infrastructure changes on school campuses, administratively complicated application and project selection processes, and misaligned school and stormwater program funding objectives — have made applying for and receiving stormwater program funds to remove impervious surfaces difficult for school districts in California. However, it is worth noting that depaving and greening projects have been extensively funded through stormwater management programs elsewhere in the U.S. For example, in Philadelphia, the Green City, Clean Waters program implemented by the city's Water Department (which emerged from an EPA consent order) partners with the School District of Philadelphia for green stormwater infrastructure installations.[325]

FIGURE 11

Examples of a Schoolyard Transformation at Normandie Avenue Elementary

The Los Angeles Unified School District school removed impervious surface material and subsequently installed (left) bioswales and (right) climate-wise landscaping. This project was funded through DROPS and implemented by LAUSD in partnership with the Council for Watershed Health (CWH), Nature Nexus Institute, and TreePeople. Source: Drew Ready (2024)

3.2.5. Finite Space on California's Public School Campuses

School campuses have a finite amount of space to serve all of their essential functions. School districts may believe that greening efforts conflict with already longstanding and long-competing school land use planning priorities — adequately housing students, maintaining reasonable class sizes, and providing playground spaces.

Depaving and using parts of a school campus to plant trees may require committing to a campus configuration that has limited adaptability for other future uses. California Education Code Section 14030 stipulates that "Site layouts shall have capability for expansion without substantial alterations to existing structures or playgrounds. 1. Site layout designates area(s) for future permanent or temporary additions that are compatible with the existing site plans for playground layout and supervision."[326] The CDE's *Guide to School Site Analysis and Development* (2000) also includes specific recommended classroom size and play area acreage "requirements" for school districts to consult when they master plan potential new school sites that are referenced in Section 14010 of Title 5: "The net usable acreage and enrollment for a new school site shall be consistent with the numbers of acres and enrollment

established in Tables 1-6 of the 2000 Edition, 'School Site Analysis and Development' published by the California Department of Education." More generally, the guide encourages school builders to develop site plans that will enable future expansions to accommodate additional students and facilities, specifying that plans for new school sites "should show the layout of the proposed buildings and grounds, parking area and roads, and playfield areas as well as future additions and the expansion necessary to accommodate the site's maximum proposed enrollment."[327]

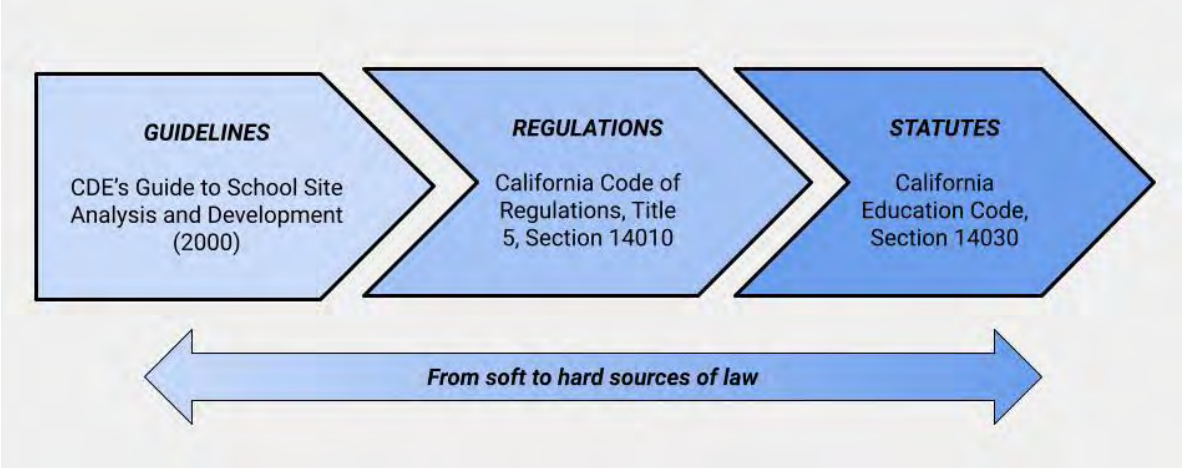
Taken as a whole, the state Education Code and CDE guidance (provisions of Title 5 and the Guide to School Site Analysis and Development) governing the site design of school facilities seem to encourage schools to design campuses that will be able to accommodate additional structures in the future without requiring significant changes — e.g., removal of trees and/or depaving.

At the same time, Title 5 acknowledges various circumstances that may prevent school districts from being able to accommodate the site requirements in the guide, including land development resulting in insufficient land to meet the requirements.[328] The guide also acknowledges the need for flexibility in designing school campuses. However, school districts may have narrowly interpreted the requirements in the guide in a way that discourages efforts to introduce more permanent green landscape features in K–12 public schools.[329]

Misconceptions about the legal authority of the CDE's *Guide to School Site Analysis and Development* may contribute to school district perceptions about how schoolyard greening projects affect their ability to meet the recommended requirements in the guide. Regulations, such as those outlined in Title 5, are a formal category of law (administrative law) that is developed and administered by implementing state agencies (e.g, the CDE). Regulations are developed and enforced by state agencies to implement the provisions of legislatively enacted statutes (e.g., the California Education Code). The guidelines that are developed by state agencies to steer the implementation of statutes and administrative regulations (e.g., CDE's *Guide to School Site Analysis and Development*) are a form of "soft law" — rules that do not have legally binding authority but are meant to influence conduct.

FIGURE 12

The CDE's *Guide to School Site Analysis and Development* as a Source of Law



In sum, the guide is not legally binding and recognizes circumstances that may compel school districts to deviate from the recommended site planning requirements. However, it is possible that **school districts have been and may still continue narrowly prioritizing their ability to accommodate potential increases in student enrollment and providing adequate play spaces for students when site planning for new schools.**

As previously explained, ensuring schools can adequately house students in the face of potential student population increases in future years has been a consistent top priority for the state, particularly in large and densely populated school districts like LAUSD. The state has often relied on the use of portables to help meet its school facilities needs, and portables are likely to remain a key feature of the state's efforts to ensure all its students are properly housed on school campuses. At present, portables constitute approximately 43% of LAUSD-owned buildings[330] and 30% of all available classroom spaces in the district.[331] California's school districts have been equally concerned about compliance with physical education and playground space standards.[332]

These two top priorities alone have been competing with each other for space in California's school campuses since the 1930s.[333] Minimum playground space requirements have conflicted with class-size reduction efforts in the state and vice versa in the past.[334] For example, student overcrowding in the 2000s — in part due to CSR — led California's schools to locate some of their classrooms on blacktops and playing fields, despite state law mandating minimum space requirements for physical education.[335] The state subsequently implemented the Escutia Program in 1998 to reduce CSR-related playground encroachment by assisting school districts with the costs associated with implementing CSR (i.e., acquiring sites for school construction and other facilities-related costs) to recover lost playground spaces and bring schools districts back into compliance with CDE play area size standards.[336]

Without more clarifying guidance from the CDE, school districts may believe that more intensive greening projects that significantly and permanently alter the amount of available ground surface on school campuses will prevent them from accommodating more classrooms and adequate PE areas for students in the future — priorities that have historically and are likely still in tension with each other for many school districts where land scarcity remains a pressing issue.

FIGURE 13A&B

Recently Installed Schoolyard Forest at Parkway Elementary School in Sacramento City Unified School District (SCUSD), California

A. Signage describes a schoolyard forest that was recently installed at Parkway Elementary School in Sacramento City Unified School District (SCUSD) through the GSA-led California Schoolyard Forest System initiative.

B. The schoolyard forest will eventually mature into a tree-covered natural play space, replacing an area previously covered by turf. Source: Natalie van Doorn (2024)

4. RECOMMENDATIONS TO SUPPORT DEPAVING OF SCHOOLS

California's school campus design — typically open school campuses with sparse tree canopy — may reflect longtime tensions over land use planning between schools, municipalities, and the state that have become increasingly evident in current schoolyard greening efforts. School district educational planning and state and municipal land use/community planning in California often have conflicting directives and goals. School districts aim to design school campuses that are both safe and easy to maintain and capable of adequately housing current and future student populations while also being able to accommodate mandated minimum playground space-per-student requirements. Meanwhile, the state aims to capitalize on schools as anchor institutions within communities that can serve as impactful strategic locations to increase green infrastructure in the state without fully appreciating the impact that demands for greener school campuses will have on how schools will be able to allocate their existing and future resources — including space — to meet their multiple, and often, competing needs.

Based on the preceding analysis, the major barriers to depaving for school greening are: (1) the lack of state-level resourcing to support the maintenance of school facilities and the downstream impacts this has had on the ability of schools to implement and provide long-term maintenance for green infrastructure on campuses, (2) the complicated, time-intensive school construction/improvement approvals processes meant to support school building safety but that unintentionally introduce burdensome administrative and financial barriers to school greening projects, (3) the narrow standards of "play" in schools, and the playgrounds and facilities that have been designed to accommodate them, and (4) other general funding opportunities being implemented in such a way that schools may find it challenging to secure, or undesirable to pursue, funding from these opportunities to support school greening projects. Action will need to be taken at both state and local level to begin addressing these barriers. The policies and other strategies to encourage depaving for green schools will need to (1) remove both real and perceived barriers that schools and school districts face when considering whether to undertake school greening projects and (2) mitigate or remove the systemic barriers limiting resources to support improvement and maintenance of school campuses.

Based on an assessment of the barriers discussed, recommendations to create conditions that incentivize school districts to depave their schools are discussed below.

4.1. Expand Standards of "Play" in California Schools

California schools have designed their schoolyards to conform to physical education (PE) standards that have primarily centered on organized games and other forms of organized play.

Despite the efforts of a U.S. "adventure playgrounds" movement in the 1960s to 1970s that aimed to increase opportunities for school children to engage in more creative, unorganized, and developmentally stimulating forms of play and more organic schoolyard designs that would be conducive to this type of play, most schoolyards today in California — and the U.S. — feature standardized traditional play equipment installed over hard surfaces.

As many as 16 adventure playgrounds were established in the U.S. at the height of the movement in the 1970s, though many gradually shut down in response to growing concerns about playground safety in the late-1970s. Few "adventure playgrounds" exist in the U.S. today.[337]

Factors that have likely prevented this movement from mobilizing more sweeping changes in PE curricula and corresponding playground designs include growing educator and parental concerns about protecting students/youth from unnecessary risk (and a growing cultural aversion to risk in general) and school administrator concerns about playground safety (including compliance with evolving national- and state-level playground safety regulations),[338] liability for student injuries incurred on school properties, and the ease with which these playgrounds could be maintained by schools.

Depaving schools and encouraging playgrounds with more pervious surfaces will also **require school administrators to change their perceptions about what qualifies as "play" and "PE activity."** The California Department of Education (CDE) can support these changes by **updating its PE curriculum development guide to include language that considers the ways in which natural play activities can be used to achieve mastery of physical fitness skills/milestones.** It will also require modifying policies to accommodate the liabilities that may be associated with playgrounds with more pervious surfaces — which may be a more difficult change to achieve. However, it is important to recognize that leaving impervious surfaces in place may not necessarily reduce liability of injury on playgrounds, given that falls on hard surfaces continue to be one of the leading causes of student injuries on school playgrounds.[339]

4.2. Update Guidance on School Site Planning and Title 5: Removing a Perceived Barrier to Schoolyard Greening

Housing student populations and providing adequate play areas for students has been and will remain a top priority for California public schools. At the same time, **school districts may not be informed about leeway that they have to site plan their campuses to simultaneously meet these needs while promoting greener campuses.** Because the recommended acreage requirements in the *Guide to School Site Analysis and Development* are cited directly in Title 5 regulations, the guide's standards can plausibly be interpreted as quasi-regulatory guidance. However, Title 5 also specifies that school sites may not be required to meet the recommended acreage standards in the guide, if school districts can demonstrate that the school site can still meet student educational and PE needs (Section 14010).

Consequently, the CDE could alleviate any misconceptions that school districts might have about how school site planning standards affect school greening efforts by updating the guide — last updated over two decades ago — to clarify how schools can reconcile efforts to promote greener school campuses and Title 5 site planning regulations. The agency might also consider amending/introducing provisions in Title 5 that more clearly articulate how school districts can balance student housing and PE program requirements with school greening priorities.

Similarly, nongovernmental organizations (NGOs) actively supporting schoolyard greening efforts might also consider developing more technical assistance resources to help school districts engage in more creative school site planning that satisfies the CDE's recommended acreage requirements by treating areas within school campuses as multiuse spaces rather than discrete-use spaces (i.e., green landscapes that can simultaneously be utilized as outdoor classrooms and play areas).[340]

4.3. Properly Resource School Facilities: SFP and Beyond

As some public school financing advocates and scholars have asserted,[341] overall efforts to decrease inequities in school spending have been undermined by the state's approach to school facilities spending. Many efforts to equalize or increase school spending have historically been directed primarily to instructional resources — with good reason. However, school infrastructure — i.e., access to safe, clean, healthy, and stimulating physical school environments — significantly impacts student achievement, as evidenced by a growing body of literature examining the effects of access to green landscapes and exposure to other environmental conditions in schools on student educational performance.[342]

Moreover, as schools reconsider and redefine their notions of "play" within the context of physical education (PE) curricula, how the state funds facilities and operations will also need to be reconsidered to ensure outdoor learning environments are adequately supported. **Outdoor learning environments sit at the intersection of two historically separate state school funding categories — school operations/instructional resources and school facilities. Being able to properly resource both the construction and maintenance of outdoor learning environments will require providing resources to construct, maintain, and hire the requisite teaching staff to make optimal use of these facilities.**

In a plan recently released outlining nature-based strategies to mitigate carbon and other greenhouse gas emissions, the state proposed that the State Board of Education ensure that schoolyard greening is integrated into new school construction and school improvement projects funded through the School Facility Program (SFP).[343] Heat resilience researchers have also recently recommended the SFP as a potential source of funding to support school greening projects. However, the aforementioned limitations of the SFP's funding structure and program design may make the program an unreliable source of state funding for school greening projects.[344] The SFP relies on voter-approved bonds for funding, and as a result, is not consistently funded from year to year. Moreover, the SFP distributes funding to school districts based on their ability to raise matching local funds, which makes state facilities funding often inaccessible to school districts with low property wealth/tax bases.

California voters recently approved Proposition 2 (formerly AB 247) in the November 2024 election while the California Legislature is currently considering SB 28 — measures that both intend to improve how SFP funding is allocated to schools.[345] However, school facilities researchers assert that these proposed policies are inadequate because they do not go far enough to address the root causes of SFP's limitations — its reliance on local property taxes as its primary source of revenue.[346]

The SFP would require major reforms to become a more reliable source of funding for school greening projects. These reforms include **dedicating more funding to support school improvements (to the Modernization subprogram) and, more broadly, modifying the matching funds requirement so that school district access to state school facilities funding is not so reliant on the ability to raise local property taxes.**

4.3.1. Include Outdoor Playspaces as an Eligible Facility Type for SFP's Joint Use Program

Joint development for joint use — a type of joint-use partnership that involves schools partnering with other entities to co-design and co-fund facilities that will be accessible to both students and the wider community[347] — could provide school districts with an opportunity to access much-needed state-level funding to support their own needs for greener play spaces and their communities' needs for more recreational spaces. Nonprofits are often able to secure large amounts of schoolyard greening funds that school districts can leverage through joint-use partnerships to defray the costs of larger-scale greening projects, like those that require depaving.

The state also seems to encourage joint-use partnerships to support efforts to finance school improvements. Both the California Department of Education (CDE) and the Division of the State Architect (DSA) encourage joint-use partnerships in their agency documents, and the state also created a special supplemental joint-use subprogram within the SFP beginning in 2002.[348] Though the Joint Use program receives the smallest proportion of overall SFP funding,[349] it may still provide additional state funding that could be used to support school depaving/school greening efforts. However, a number of challenges may prevent joint use partnerships from supporting greening projects that require depaving.

Playgrounds and outdoor recreational spaces are not currently one of the types of joint use facilities that qualify for school facilities construction funding through the SFP's Joint Use subprogram.[350] Consequently, it will also be necessary **to modify the criteria specifying the types of school improvement projects eligible to receive SFP funding to include outdoor recreational areas/playgrounds.**

It may be tempting to rely on projected student population trends in California schools as a substitute for the school funding system reforms necessary to more systematically support greening projects in schools. Student populations in California are projected to decline in the coming decade.[351] LAUSD's student enrollment has been declining for two decades.[352] While school greening advocates might argue that enrollment declines translate to less student overcrowding and school districts being able to use the "extra" space in their schools to accommodate more campus greening projects, the reality is more complicated. Due to the aforementioned features of the state's school funding system, declines in student enrollment may have more complex implications for public education spending and the use of space in school facilities. Because the state apportions operations funding to schools according to student daily attendance levels, student enrollment declines in recent years have led to lost revenues and to school districts in California responding by shuttering and/or consolidating schools.[353] These actions may lead to overcrowding in newly consolidated schools. Resulting

budget shortfalls may also result in schools having less operational funding to support the M&O staff needed to maintain school facilities. Moreover, the projected declines in student enrollment may not last. California experienced a similar student enrollment decline in the 1970s — during which student enrollment decreased 1% per year between 1970 to 1980[354] — only to experience a resurgence in student enrollment in the 1990s.[355]

Until California develops a more efficient system to fund school improvement projects, schoolyard greening projects, particularly those that require major investments, like depaving, will likely face resistance from schools already struggling to ensure their existing operations budgets covers basic M&O activities, and school district facilities officials struggling to make their school construction and improvement budgets cover basic facilities maintenance and remedial repairs.

4.4. Leverage Stormwater Management Programs to Encourage Schools to Depave

State and local storm water management programs have provided unprecedented opportunities for cities to depave more of their landscapes within the last decade. Stormwater management programs support efforts to capture and conserve more water in urban ecosystems and to increase and improve urban water quality. In California, the State Water Board's Municipal Storm Water Program requires that municipal separate storm sewer systems (MS4s) develop and implement comprehensive stormwater management programs that monitor and reduce their levels of pollution runoff to obtain a municipal stormwater permit. Municipalities have also established a number of local stormwater programs — like the Safe, Clean Water Program (SCWP) in LA County — that supports state and local efforts to reduce stormwater runoff, in part, by encouraging landholders to depave their properties through a fee program and using the fee revenues to finance more stormwater management infrastructure projects (including depaving).

Public schools in LA County alone have the potential to capture upward of 2 billion gallons of storm water a year.[356] Moreover, school districts in California — and the Los Angeles Unified School District (LAUSD), in particular — own and manage significant areas of land containing large quantities of impervious surface and, as a result, may be a major potential contributor of stormwater runoff pollution. However, school districts have been excluded as a type of entity obligated to comply with runoff pollution requirements through the Municipal Storm Water Program. Schools in LA County are similarly exempt from the parcel tax (fee) enacted through the Safe, Clean Water Program.

The State Water Board is currently updating its municipal stormwater permit structure — Phase II Small Municipal Separate Storm Sewer System (MS4) Program[357] — and many land use, water, and conservation organizations have already advocated and continue advocating for the **State Water Board to include school districts in its stormwater management permit program.**[358] Similarly, **municipal stormwater programs should consider including school districts as a type of landholder that must be assessed for stormwater fees.** The omission of school

districts from these programs represents a missed opportunity for the state to establish stronger incentives for public schools to depave their campuses — and to subsequently make more resources available for them to do so.

4.5. Address the Common Barriers in Other Sources of Schoolyard Greening Funding

A large number of the funding opportunities that have been available to support schoolyard depaving and greening over the last couple decades have been provided through state and local stormwater management programs. However, common barriers to school districts pursuing and/or securing this funding include: fear of liability, the long-term maintenance costs related to infrastructure changes on school campuses, administratively complicated application and project selection processes, misaligned school and stormwater program funding objectives, and assumptions that school-based projects will provide limited greening and climate benefits due to their generally smaller scope/physical area of projected impact.

Some of these barriers — unclear application processes and poor transparency during project selection — are not specific to stormwater management funding programs but common to many grant-funding opportunities and, therefore, are not likely to be easily resolved.

Others — like assumptions about the limited greening and climate benefits of school-based projects and misaligned objectives — might be addressed by **encouraging the public agencies administering grants and overseeing the project selection process to provide both more clarity and flexibility in their request for proposal (RFP) guidelines that consider and accommodate the objectives and scope of school-based projects.** Spreading more awareness to administering agencies and project selection committees about the transformative multifaceted benefits of school-based projects will also require **more public education about the value of school sites as strategic anchor institutions where demonstration stormwater management and greening projects are necessary** to allow the wider public to see and feel the benefits of these kinds of investments.

5. FUTURE RESEARCH DIRECTIONS

The historical drivers of impervious surfaces in schools and the factors that have sustained these surfaces in schools is a niche and understudied topic with a number of large, dynamic, and intersecting factors. As a result, neither much academic or gray literature nor California-specific literature exists on this topic. This report relied on a large number of primary source materials — e.g., unpublished student theses and dissertations, government and policy documents, notes about conference proceedings — to help answer its central questions.

Moreover, because no interviews with school personnel were conducted to confirm how policy procedures outlined in published law, policy, and other guidelines were actually implemented and how compliance with these procedures plays out on the ground, this report could not include a more critical analysis of the factors that have affected the efforts to depave school campuses as part of the overall implementation of schoolyard greening initiatives in the district.

5.1. Questions for Further Study

To better understand the historical and policy developments that have made impervious surfaces so pervasive in schools and the factors that make impervious surface removal difficult or undesirable for schools, the following topics are suggested for further study:

- How did municipal zoning/local land use policy impact the evolution of tree canopy cover across schools in California during the suburbanization period between 1940s to 1970s?
- What roles have state fire building codes in schools and cities at large and the Division of the State Architect (DSA) Fire and Life Safety (FLS) protocols played in shaping the present distribution of urban tree canopies in California?
- What role did school administrators, school builders, and other educational professionals in California play in the use of asphalt as a surfacing material in school playgrounds and grounds more broadly in the state? Similarly, what role did asphalt industry trade groups and associations play in the popularity of asphalt as a ground surface material in schools?
- What role did soil contamination at school sites in California play in the popularity of asphalt as a school surface material in schools constructed in post-industrial areas?
- What kind of commercial investments have been made in “Cool Pavement”? How might these investments affect support for heat resilience alternatives that focus on nonliving forms of green infrastructure?
- How did the 1972 Amendments to Title IX requiring equitable access to play spaces in California’s public schools between genders affect the composition of playground surface materials in schools built or modernized from 1970s onward?
- How did the impact of a 1950s state policy[359] — removing the requirement that municipal and school district boundaries coincide — affect how school districts are funded?
- What is the ratio of landscape maintenance staff to the acreage of vegetated landscape in California schools? How does this vary by school district, particularly with respect to property tax wealth and the socioeconomic status of families within districts?

- How do school facilities and landscape maintenance staff perceive the benefits and drawbacks of depaving and greening projects?
- How do the perspectives, needs, and knowledge of different stakeholders involved in landscape management, maintenance, and use (i.e., district facilities officials and grounds maintenance staff, teachers and staff at schools) affect local support for and implementation of schoolyard greening efforts?
- What factors have contributed to school districts narrowly interpreting the California Department of Education's school site-planning guidance in a way that limits efforts to introduce more green landscapes on school campuses?
- What factors discourage school districts from remodeling their schoolyards so that they can accommodate more free, unorganized styles of play?
- What learning standards currently require or align with the inclusion of more vegetated landscapes at schools (e.g., environmental and climate literacy)? When and how were they developed? How have they evolved over time?
- How can current and future stormwater management funding programs create opportunities for schools to remove hardscape while reducing potential risks associated with managing off-site stormwater?
- How does the extent of hardscape, and the policies that caused and sustain that hardscape, vary across the geographically and socioeconomically diverse school districts in California?
- How do the factors affecting choice of schoolyard surfacing material discussed in this report differ in other states within the U.S. (i.e., federal, state, and local laws; guidelines; and financing, as well as historical school building trends)? What are the ramifications of those differences for school depaving and greening initiatives? Which insights from the California context are — and are not — applicable to other states?

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